Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

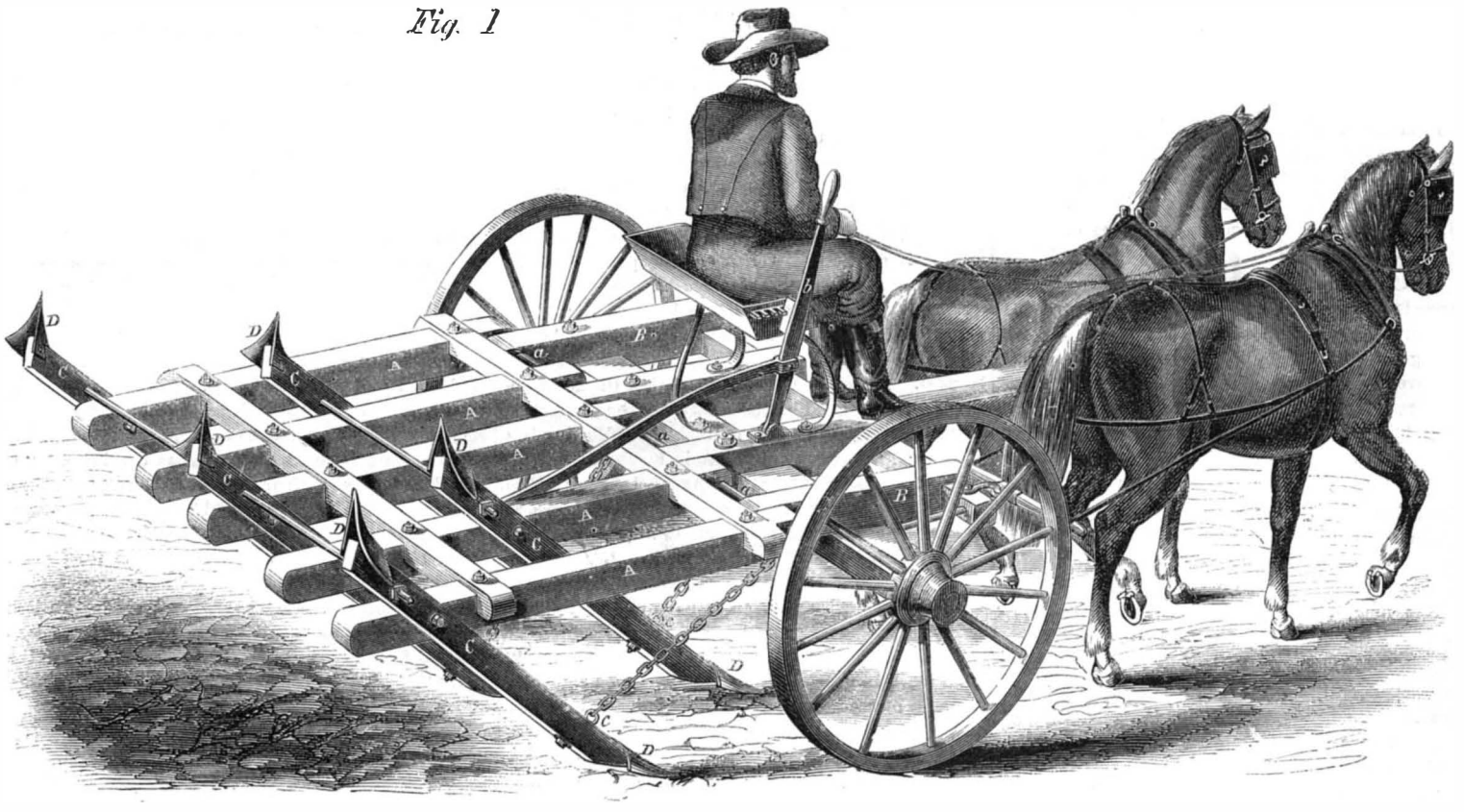
VOL. VII.---NO. 20. NEW YORK, NOVEMBER 15, 1862. NEW SERIES

Improved Patent Cultivator.

Few inventions have become more celebrated than those which have aided in developing the agricultural resources of the country; their number is increasing every day we are pleased to notice, and we hope that they will continue to multiply until every detail of the farm which can be properly worked in that manner may have its special apparatus. Annexed is an invention designed for cultivating crops or grain lately sprung from the earth. It is a very simple machine to operate and for that reason, if for no other, should be in favor with agriculturists. The following explanation will make the engraving intelligible :—The five timbers marked A are joined to the frames, B, by a long bolt, *a*, running through them from one side to the other. The inclined bars or helves, C, as the inventor styles them, on which the plows, D, are secured, are also vibratory on their axes, and have chains attached to their lower ends which regulate the depth of cultivation. The plows themselves are not patented, but are intended to be of any form that the farmer may deem best suited to his purpose. The lever, *b*, is connected by means of a long rod and suitable joints to the frame, A, and has a series of catches or recesses on the drivers's seat into which it works; by moving the handle or lever either forward or back, the proper depth of cultivation is reached; and the frame retained in its place by the catches and the chains on the helve, C. The other parts may be readily understood at a glance. The cultivator is operated by horse or cattle power, and the various changes which are demanded by the nature of the crop can readily be made; for instance, if it be desired to cultivate a growing crop, such as corn, sugar-cane, cotton, &c., the team must travel in the furrows, the central helve be removed from the fr ame, and the remaining four so disposed in relation to the center of the same that they will embrace the crop between them; the wheels also occupying such a position on the axles relative to the plows that they may not injure the crops by traveling over them. Upon starting the horses the plows are let down and the furrows are then thrown up against the cane, cotton or other plants by their action.

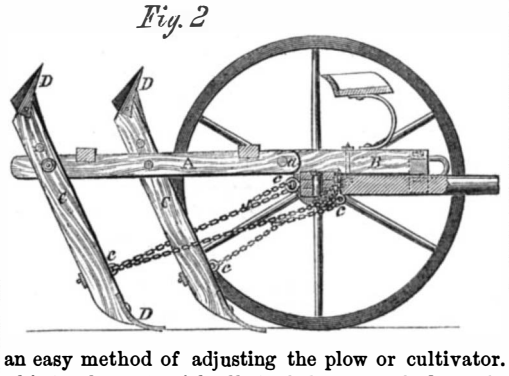
Fig. 2 shows in section the frames, helves, plows, the minor details of the cultivator, and the mode of attaching the chains to the axle, by means of the eye-bolt, *c*, they are rove through these and the hook thrust through one of their own links; this affords

Fig. 1



CORNICK'S PATENT CULTIVATOR.

Fig. 2

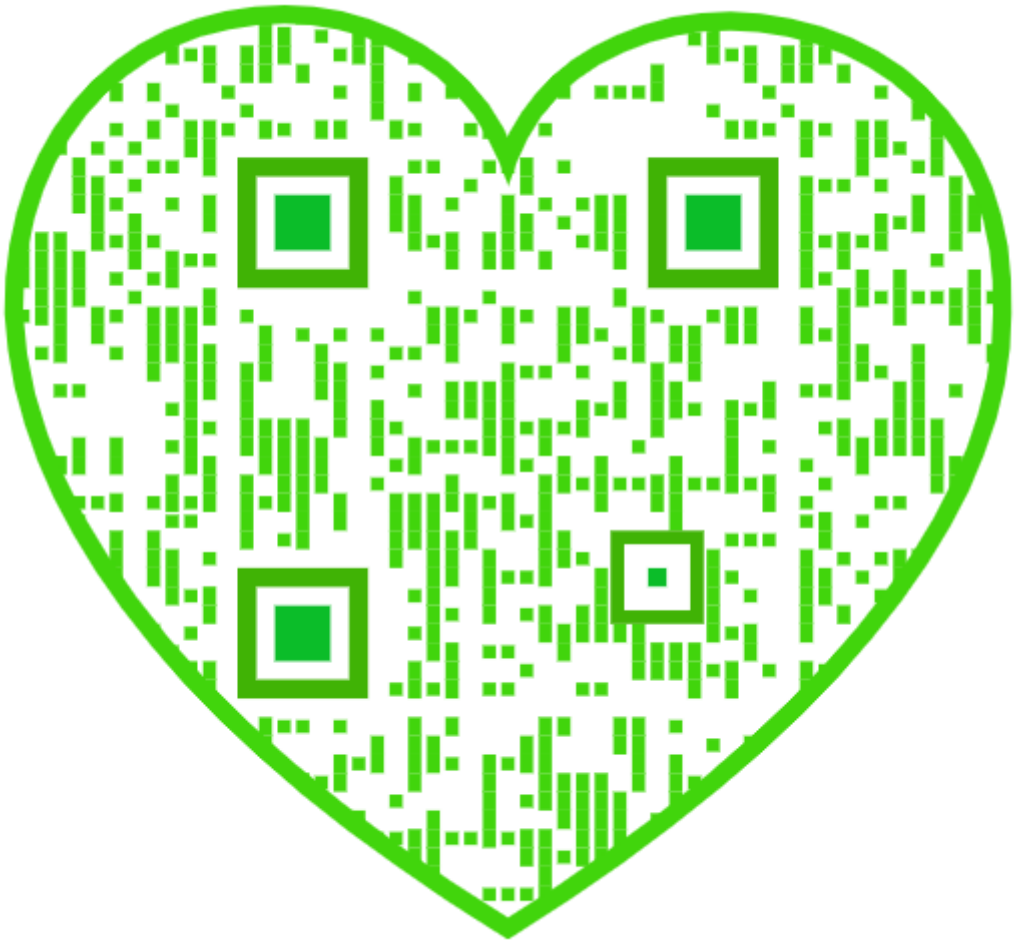


an easy method of adjusting the plow or cultivator. This implement, with all the helves attached, can be used for covering in small grain, and the inventor claims that it will seed more than double the area that a harrow will. As the depth to which land in proper tilth is definitely fixed, the necessity of going more than once over the field is avoided. If it is desired to break the land for a crop to be seeded, the number of plows, breadth of frame and the length of axle must be in proportion to the strength of the team, and turning plows either all left or else all right-handed, must be used. When occasion requires the bolts which sustain the helves, C, can be withdrawn, the helves themselves reversed and the cultivator (seen projecting upward) used; the difference between the relative distances of either end from the center being regulated by lowering the frame, A, by means of the lever, *b*. The whole apparatus seems to us to be very strongly built and well put together, the cost is not great, and its simplicity must, we think, recommend it to all farmers. The patent was granted, Nov. 27, 1860, to T. R. Cornick, of Cap-au-Gris, Lincoln county, Mo., to whom all orders should be addressed.

IMPREGNABLE PORTHOLE.—When we gave in our last number an extract from a foreign journal describing this invention, we failed to notice that it was essentially the same thing as that patented in this country by Capt. Charles F. Brown, of Warren, R. I., July 17, 1855. Capt. B. obtained a patent for an improvement on his first invention, Aug. 22, 1862.

BOAT-BUILDING AT PITTSBURGH, PA.—There have been more new steamers built at Pittsburgh, Pa., this summer, than for any corresponding period during the past ten years. Thirty new steamers have been completed there since last April, and ten or twelve more are being finished. Some of them have been purchased by the Government, to be used as gunboats.

© 1862 SCIENTIFIC AMERICAN, INC.



MISCELLANEOUS SUMMARY.

FRUIT AS MEDICINE.—Ripe fruit is the medicine of nature; nothing can be more wholesome for man or child, though green fruit is, of course, rank poison. Strawberries are favorites with all classes and constitute a popular luxury. Who can tell the number of disordered livers and digestive apparatuses generally restored by that fruit? After them we do homage especially to peaches, and apples, and grapes. We once knew a person who, believing himself in a decline, determined to eat from four to six ripe apples a day, and note the result; in three months he was well. We know of another who was in general ill health that commenced the habit of drinking a glass of plain cider every morning, and never had a day's illness in twenty-five years thereafter. Such remedies are simple enough.

TO HARDEN AND POLISH ALABASTER.—1. Take a strong solution of alum, strain it, and put it into a wooden trough sufficiently large to contain the figure, which must be suspended in it by means of a thread of silk; let it rest until a sufficient quantity of the salt is crystallized on the cast, then withdraw it and polish it with a clean cloth and water. 2. Take white wax, melt it in a convenient vessel, and dip the cast or figure into it; withdraw and repeat the operation of dipping until the liquid wax rests upon the surface of the cast; then let it cool and dry, when it must be polished with a clean brush.

AMERICAN JUTE.—At the late monthly meeting of the Franklin Institute (Philadelphia), held on the 16th ult., specimens of American jute were exhibited by Mr. Howson. It was stated that in its natural condition stalks of the plant when at their full growth are from five to six, and even seven feet high, and vary from a quarter of an inch to five-eighths of an inch in diameter. The number of stalks from one root varies from eight to sixty, and eighteen stalks will, on an average, produce four ounces of disintegrated fiber.

THE late census returns of manufacturing establishments in New York reveals the astonishing fact that more capital is employed in carrying on the printing trade than in any other business, the amount being over eight and a half millions! Over six thousand persons are employed in printing, and the various establishments use up about $5,000,000 worth of raw material, ink, paper, &c., per annum, producing over $11,000,000 worth of books, papers, &c.

The Port Jervis *Union* says that there is now being erected on the line of the Erie Railway, in that village, the largest water tank between New York and Dunkirk. It is constructed of brick, sixty-five and a half feet long, twenty-three feet wide, and thirty-three feet high. It contains three tubs, each sixteen feet high and twenty feet in diameter, with a capacity of 18,800 gallons to each tub.

THE *Alta Californian* states that the population of San Francisco is 32,000 white males over 21 years of age, 17,500 females over 18 years of age. The number of persons of both sexes under 21 and 18 years is 25,000. There are 3,250 Chinese, 1,875 of African descent, and 4,200 other foreigners.

LATE California papers state that sugar and sirup, made from the Chinese cane and a better article than the imported, has been made in considerable quantities in the State. Tulare county will be able to supply her own population with sugar and molasses.

THERE are no less than 384 vessels built and being built for our navy. Their total tunnage is 371,665 tuns; guns 434. Of these there are 13 iron-cased gunboats built, and 40 new river and sea gunboats of different sizes in different stages of progress.

A DISTINGUISHED physician in Paris, Dr. Robert De Lambelle, announces that a shock of electricity given a patient dying from the effects of chloroform, immediately counteracts its influence and restores the sufferer to life.

AN infectious and fatal disease has lately appeared among milch cows in St. Albans, Vt., and all persons concerned are warned against skinning and tanning their hides, as fatal consequences have been known to ensue.

THE stage machinery of the new Vienna Opera-house is to be worked by a steam engine of eight-horse power.

VALUABLE RECEIPTS.

BLACK WRITING INK.—In our last we gave Ribancourt's receipt for making French ink; and it is undoubtedly a good one. A very great number of receipts have been published in various works for making writing inks, and as black is the most common and is really the best ink for writing upon white paper, of course, most attention has been devoted to obtaining a superior quality of it. It should possess the qualities of intense blackness, flow freely, be permanent and free from grit. Arnold's (London) writing ink is sold in large quantities in the United States, and it appears to be the most limpid that is in use. It is green when first applied, but it soon becomes a deep black. There are other inks which are also green when first used, but most of them soon become thick and clog the pen. The method of preparing Arnold's ink has not been published in any foreign work under that name, but it is supposed to be the same as that of H. Stephens, indefinitely described in "Muspratt's Chemistry" as follows:—"This celebrated writing fluid is a tanno-gallate of iron dissolved in sulphate of indigo; the common ferro gallic writing inks consist of a liquid in which the tinctorial matter is suspended by means of gum, while in this the color is in complete solution." We will now give Reid's method of making a ferro-gallic ink:—Take bruised galls, 1 pound; sulphate of iron, 3 ounces; gum arabic, 3 ounces; water, 3 quarts. The galls are boiled with three pints of water till one-third of the liquid is evaporated; this is poured off and the remainder of the water added and boiled again until one quart is left. The decoction is then poured off and the sulphate of iron and gum added and dissolved, when the whole is left for twenty-four hours, and then may be used. If the decoction of galls is exposed for several days to the atmosphere before being mixed with the sulphate of iron, a better result will be secured. A decoction of galls or a decoction of sumac containing a small quantity of the sulphate of iron is the base of all the best common writing black inks, but a little logwood added undoubtedly im ts to it a more intense shade. A very small qualtity of the sulphate of iron should be used. Professor Brande states that the great object in making good ink is to regulate the proportion of sulphate of iron to the galls. The following is a good receipt:—Ground logwood, 1 pound; bruised galls, 2 pounds; sulphate of iron, 1 ounce; gum arabic, 1 ounce; water 16 quarts. The logwood is scalded first with the 16 quarts of water; then the clear is poured off and the galls boiled in it until it is reduced to half the quantity, when the sulphate of iron and gum are added and stirred until dissolved, and the whole is then poured off through a strainer and cooled. The gum is used to keep the black coloring matter in suspension. About the one-eighth of an ounce of creosote added will prevent the ink from becoming moldy. A few drops of the oil of cloves answer the same purpose. Runge's chromate black ink is made as follows:—Logwood, 22 pounds; neutral chromate of potassa, 1¼ ounces. The logwood is boiled for about three hours in fourteen gallons of water, the clear poured off and the chromate added. It must be remembered that it is not the bichromate of potash which is so much used now to make dirty ink, but the chromate that must be employed, and no gum is added. Most inks contain too much gum, thereby causing it to clog the pen. This ink has been highly commended. Copying ink is made by simply adding a little sugar or sugar candy to common inks which contain gum. The addition of a little neutralized sulphate of indigo to any of the ferro-gallic inks imparts to it a bluish-green shade which disappears after writing when exposed to the air. In our next issue we will describe indelible inks.

Mitchell's Steam Shipping Journal states that a large ferry steam vessel, to run between Dover and Calais is proposed, and it is intended to have a speed of 40 miles per hour. It is to be 300 feet in length, 100 feet wide and draw but 5 feet of water. It is designed to carry carriages, the same as the ferry boats on American rivers. It will be constructed of iron, and composed of a series of tubes.

GAS is now manufactured in Canada from crude petroleum; its cost is but $1 70 per 1000 cubic feet

Cotton-spinning in Russia.

Every Russian peasant, male and female, wears cotton clothes. The men wear printed shirts and trowsers, and the women are dressed from head to foot in printed cotton also. When it is remembered that Russia contains something like 33,000,000 of serfs, besides other classes amounting to 20,000,000, all using this article more or less, one can estimate the demand for cotton goods. But a calculation is not to be made from data afforded by free and more prosperous countries. The peasantry are poor, the cotton prints are dear. Hence there is not a tithe of the right amount of consumption. Still the cotton trade in Russia is a large trade, and it is supplied chiefly by native labor, in mills containing machinery made in Oldham and Manchester, and superintended by Englishmen from the same neighboring towns. There may be five or six millions of spindles at work spinning this cotton; together with the weaving and printing of the same, that forms indeed a large item, perhaps the largest among the manufacturing processes of Russia, and employs a capital of thirty millions sterling. The largest mills are in the neighborhood of St. Petersburg, one of these having some one hundred and twenty thousand spindles, and a few others are of seventy thousand and sixty thousand; but the great bulk of the trade is in the Moscow district, and scattered about the land in that direction. The number of spindles there may not be so great in any individual mill as in some of the large St. Petersburg establishments; but the mills are more numerous, some of them nearly as large, and all of them are of respectable dimensions, even according to an English estimate.

Cents.

This kind of coin, at one time, was looked upon with disdain, and in many cases, parties who received large amounts had to sell them at a discount. At present, cents are in demand, and bring a good premium. Considering the large quantity coined at the Mint, it becomes an interesting question as to the whereabouts of the numerous cents which have been distributed by the Government. The Mint in Philadelphia coins daily from one to two thousand dollars of them, all of which are distributed almost as soon as made; but still they are scarce. It was thought that speculation in them could be prevented by giving only five dollars' worth to each applicant; but the effort was a failure, as some persons employ a number of boys to wait their turn, and thus accumulate quite a pile, which can afterward be sold at a premium. A large number of the cents made at present go out of the city, to fill orders received some time since. As the Government pays the cost of transportation, it is their interest to send them in large quantities; therefore these orders are kept back until a sufficient number is received to justify the payment of the cost.—*Dollar Newspaper, Philadelphia.*

How Mist is Generated.

The production of mist is the subject of a note by Dr. John Davy, (brother of Sir Humphrey), in the *Edinburgh Philosophical Journal.* The cause usually assigned for mist is the access of cold air, and its admixture with warmer air, saturated, or nearly saturated with moisture (such as that resting on the surface of large bodies of water), and strikingly exemplified in our autumnal and winter fogs, when the water, owing to the heat absorbed during summer, is of a higher temperature than the flowing air. Dr. Davy, however, refers to another cause, not so much noticed, viz:—a mild moist air, coming in contact with a colder air, equally humid, resting on cold surfaces, whether of land or water, about the end of winter or beginning of spring. He describes mists which he considers to have been thus formed in the lake district of Cumberland. To a similar cause, also, he refers the phenomenon termed sweating, which is the precipitation of moisture on walls and flagged floors excluded from the influence of fire. He also attributes to a warm south wind, succeeding a very cold north wind, the deposition of a large quantity of moisture in the gallery of a nobleman in Devonshire, and quotes the saying in Homer:—"The south wind wraps the mountain top in mist."

THERE are now twenty-four steamers, English and American, plying on the great Chinese river, Yangtse-Kiang, which was lately opened to the commerce of the world.

© 1862 SCIENTIFIC AMERICAN, INC.

THE GREAT RUSSIAN STEPPES.

In the southern part of Russia lie vast tracts of country, uninhabited and solitary, save by wandering bands of Tartars; these are called "steppes," a name by which all plains and sterile flats in Russia are designated. They form one of the distinguishing features of that wild and semi-civilized empire. Dr. Hamm, a celebrated European scholar, has recently journeyed over them and embodied the results of his travels in a most interesting volume. The emotions which thrilled him upon viewing those plains for the first time, and their appearance he thus describes: "What a prospect! the sun had just appeared on the horizon and the steppe extended, measureless, in all directions. It produced the same effect upon me as I felt when standing for the first time upon the deck of a vessel with nothing but the sea and air around; the few houses were all that reminded me of man in the great, silent desert in which the eye lost itself. The brownish verdure was here and there rippled by the breeze, and the sparkling dew drops on the grass resembled the spray of the sea. In lieu of sea-gulls predacious birds circled above their hunting grounds, but there was no other living thing far or wide; in vain did the eye seek an object on which to rest, the plain stretched out monotonously in all directions; not a bush, a rock, a tree or smoke from a friendly chimney, revealed the presence of man; only steppe and that alone. The effect upon the mind is awfully grand, nor does it pall upon one with the daily contemplation of it." The whole of Southern Russia is supposed to have been at one time a huge lake, whose shores were the Hindu kush and Carpathian mountains. When this mighty sea broke its way out, it left behind a mass of slime which is now known as the Tchernazon or black earth, lying upon mummular limestone at a depth varying from a few inches to fifteen feet, and from which region the greater part of Europe is supplied with cereals. Moisture is however, an important factor, as the sun soon burns up the young crops if they have not been previously saturated with the spring rains, in the latter case vegetation bursts forth with unparalleled luxuriance, the whole steppe is covered with grass often reaching as high as a man's head, out of which grow flowers; these are called steppe gardens, and the traveler plucks with delight plants growing in the open air, which at home pined in hot-houses. By the side of these, however, through those freaks which nature seems to delight in, grow the most noxious weeds. Such is the burian, a generic title for all rank and useless growth, the steppe-needle, penetrating through the skin of cattle into their hearts, so that they perish miserably; the dumb-weed, which causes lameness in horses though harmless to oxen; the cholera-burr, which appeared with that plague and for which it is said to be a remedy, and lastly, the common salt-wort which is often rolled up by the wind in large masses, and preserved by the natives for fuel. These weeds spring up in some places almost as high as trees. Graceful, flowered-covered torch-weeds grow among them, while foxgloves, artemisias and other blooms produce a virgin forest on a small scale. Here the she-wolf has her lair, and hither she flies to hide her progeny from their numerous foes, at the head of which is their father; here too, is the uncanny schelto-pusik, a species of lizard, whose size and form startle the traveler who has heard of poisonous snakes in these wilds; and though the steppe appears empty and barren of life it contains abundance of it. Long trains of ants cross it in all directions, bees, flies and other insects flit about, while huge spiders spin their treacherous webs from stalk to stalk till whole patches are covered with their nets; locusts and grasshoppers flit through the verdure; moles and marmots sun themselves before their burrows, the hare comes leaping up devoid of fear, and hawks and kites dart along eagerly seeking their prey. All these Arcadian sights and sounds and many more the Doctor describes. His days were spent in the chase, or else in surveying districts devoted to the herds, of which he says, speaking of horses: "One almost fancies themselves on the South American plains when a tabun of half-wild, steppe horses comes dashing along, driven by a Tartar half-bred, clothed in the garb of raggedness; in front the leader charges on, despising danger. The colts, bounding from side to side, receive warning bites to keep them from straying, and the wild eyes and tails reaching to the ground perfect the impression received." Dr. Hamm also depicts with graphic skill the arts practised in taking horses, which are similar to those in use among our own herdsmen in the West, and alludes to the vast herds of whitish-gray oxen which roam those wilds, which, while they put on a bold front and are fierce-looking, yet bound away like stags upon the slightest appearance of danger. The chief staple of the steppes is wool, of which he says: "A German colonist who began a short time since with no possession but his strong arms and head, has now 300,000 merinos. As each fleece averages five pounds unwashed, owing to the want of water in that country, this man has an income of 225,000 silver roubles (a rouble being seventy-five cents) from the flocks alone. The native sheep is the fat-tail, a descendant of the Syrian breed. Unfortunately, sheep-breeding here is attended with many dangers not known in Europe, the most terrible of which are the snow storms. Unless the shepherd is weather-wise enough to foresee them, the most awful storms suddenly burst upon him, the air is full of driving lumps of snow which fall with a terrible rattle, depriving the boldest of his senses; under such circumstances there is no resource but to sit down and wait.

"The sheep do not possess that patience of which they are the symbol; the wind, the snow and the blows drive them mad; their fleeces become so loaded that they freeze hard, and their eyes so hidden that they become blind. At such times they can be no longer checked, and they speed away over hill and dale until the rivers, into which they have dashed in their mad career, become dangerously swollen with their bodies. Even when their better star brings them up against some wall they are not saved, if the storm lasts for days, as it does at times; for if the shepherd finds them, which is very doubtful, there is no way of removing them but to carry them one by one away, and the places of refuge are often miles distant. In addition to this the wolves annually carry off large numbers.

"Huge fires are lighted on these steppes by the peasants for the purpose of destroying the burian, which roll over the surface destroying everything green in the way. After such visitations the land gapes with a thousand cracks, and the blackened skeletons of plants are everywhere visible. The rains finally wash them into the earth, and with the return of spring the wasted plains grow bright again with verdure which beautifies the landscape and restores the herds that have suffered during winter for want of it. The locusts roam over these tracts in numbers appalling to contemplate, and in a short time lay waste everything before them. The people rally in great force to frighten them away, even felling the green corn to save it; but so fierce is their onslaught that but little is rescued from them."

With this brief mention we close our extracts, regretting only that our space compels us to part so abruptly from a pleasant and congenial traveler.

STRENGTH OF GUNS AND HOW TO CAST THEM.

The *Journal of the Franklin Institute* contains an account of an important conversation which took place at a late meeting of the Institute, on the subject of the metal, the molding, casting and cooling of large cannon. W. W. W. Wood, Chief Engineer of the U. S. Navy, who was present, stated that very great difficulties had been experienced in the casting of heavy ordnance. It was found that guns made of highly elastic cast iron were capable of greater endurance than guns made of more dense iron possessing greater tensile strength. He had been connected with a set of experiments wherein it was demonstrated by practical tests that heavy pieces of ordnance, the iron of which was capable of withstanding from 39,000 to 40,000 pounds' tensile strain per inch, with a corresponding density of metal, were not capable of the endurance of similar pieces made of iron which did not sustain a tensile strain of more than 17,000 and 23,000 pounds per inch, and which was of less specific gravity or density. In the latter case, one gun sustained, in addition to the proof charge, over 1,700 service charges with no perceptible enlargement except of the vent and slightly furrowing indentations leading to the same. This is certainly useful information on this subject, as it has generally been held that the most dense cast iron was the best for guns of all sizes. Chief Engineer Wood also stated that the accepted theory as to the cause of the breakage of heavy guns was, that in the ordinary method of casting and cooling, the exterior portions on cooling first produced a strain by unequal shrinkage in the mass. Captain Rodman's method of casting large guns hollow, and cooling the interior with a stream of water passing through the hollow core, is intended to obviate this evil, by equalizing the shrinkage on the inside and outside. Captain Dahlgren's method to obviate the evil consisted in casting the gun more nearly in the form of a cylinder, then turning off the additional metal on the exterior which had caused the strain in unequal shrinkage, by having been first cooled in the mold. His guns were cast solid, then the interior part, supposed to be the weakest, is bored out. The new 15-inch Dahlgrens for our armor-clads are cast hollow and cooled upon Captain Rodman's principle, but their rough form approaches to that of a cylinder 38 inches in diameter at the muzzle, which is afterward turned off to 26½ inches, as described on page 393, Vol. VI. (new series) SCIENTIFIC AMERICAN. All the English 13-inch cast-iron mortars used in the bombardment of Sweaborg burst in two equal halves after an average of 120 rounds. The age of a gun has much to do with its durability; the older it is, the greater number of charges will it withstand before bursting. Chief Engineer Wood believes that the great cause of bursting in heavy ordnance is owing to unequal expansion between the interior and exterior portions of the gun when being rapidly fired. The interior is first heated before the exterior acquires a corresponding temperature. A strain by such unequal temperature is exerted upon the gun equal to the difference of expansion due to the difference of elongation of the masses of iron. The gun which exploded on board of the *Naugatuck* afforded proof for entertaining this opinion.

Mr. John W. Nystrom, who was present, stated that it was a bad practice to cast a gun solid and turn off several inches of the exterior afterward, according to the method adapted for the smaller Dahlgren guns. The strongest part of the gun is thus turned off. He had made experiments in Russia with cast-iron bars one inch square and two feet long. One bar was cast the correct size and the other cast two inches square, then planed off half an inch on each side reducing it to one inch. The lateral strength of these bars was carefully tested, when it was found that the one which was not planed was 25 per cent stronger than the other. He had made cast-iron rollers for rolling angle irons, which were so correct that when taken from the molds and centered in a lathe there was but a mere trifle of work to be done by the tool. The mold was turned in the flask with an iron sweep of the correct shape of the roller, and no allowance made for turning the roller when cast. Since his return from Russia he had seen similar rollers molded with wooden sweeps at Phœnixville, Pa., and about ⅜ths of an inch was allowed for turning off in the finishing—just enough to take away the most valuable part of the roller. The mold should not only be formed by an iron sweep but the blocking and finishing ought to be accomplished with the same instrument, and the finishing of the roller could afterward be effected by simply grinding with emery, and thus the strongest part of the casting retained. This is the principle upon which Mr. Nystrom proposes to mold and cast guns. He believes that rifle guns may be cast so perfect that they can be taken direct from the foundry and used in active service. He would employ Rodman's process of cooling the gun from the core for the purpose of hardening it, and would then cool the entire gun by the mode in use for annealing the Whitney car-wheel by allowing one day for cooling each inch of caliber or 11 days for an 11-inch gun. When the gun has cooled down to 400° Fah., it should be lifted from the pit, the muzzle closed with a wooden plug to prevent the air conducting away the heat from the bore, and the outside should be cooled with water to the temperature of the atmosphere. No water should then be permitted to get inside. The object of this last cooling operation is to give the metal in the bore a slight tensile strain, while that on the outside is slightly compressed. When a gun thus made would become hot by firing, there would be the least strain in the metal by

© 1862 SCIENTIFIC AMERICAN, INC.

shrinkage, and a very strong gun would thus be secured. Formerly iron guns were cast finished on the outside—they were at least seldom turned.

THE PROPORTIONS, FORM AND DIMENSIONS OF THE SEVERAL CLASSES OF WAR-SHIPS FOR MODERN SERVICE.

[Continued from page 293.]

The displacement ought in every case to be the base of construction, and, given a certain fixed displacement, the lines of greatest efficiency, with a certain relative power, are required to be deduced therefrom. Fincham, a recognized authority on naval matters, treating on the same subject, says: "All the elements of a ship mainly depend upon her armament, the number of men, the weights and stores varying accordingly." . . . . "If, therefore, a ship be made too small for her force, the weights necessary to that armament will sink her too deep into the water, and the displacement will exceed that in relation to which the other properties of the ship had been determined, and the qualities essential to her excellence as a ship of war will be impaired." And again he says: "For since the displacement varies according to the force, and the ship must be relatively full or sharp to obtain this displacement, according to the dimensions, we may readily tell, by a comparison of these two qualities, whether the relation they bear to each other is common to good ships."

The same opinion holds very generally in the navy yet, although considerably modified even since Fincham's last edition, 1852. The standards of the profession are not so easily discarded, especially when the profits of the construction and employment of the ships are of no consequence; and notwithstanding Fincham, Peake, and many of our ablest constructors have advocated change in the method of registering the size, either by internal measurement or displacement, no change of the kind seems probable, as a few tuns O. M., more or less, a few feet on the length, and a few inches on the breadth and depth, are manipulated as carefully yet as if they involved immense interests, while the displacement and form are varied in a manner as arbitrary as if the sole test of the efficiency of these elements were the ability to carry any burden imposed on them, and as if speed were merely a question of power, with which the form of the vessel has nothing to do.

My notion of the process is to reverse it; define the displacement first, and from it determine the best dimensions, form, power, and armament. By this means only, it appears to me, shall we ever be able to obtain the greatest uniformity of efficiency in every respect. For this purpose I would arrange the respective classes of war vessels according to their displacements, which in no case need or should exceed .5 of the parallelopiped of load immersion; the midship section, .8 of the transverse parallelogram of load immersion; the draught of water up to 4,000 tuns, .7 of molded depth, and from 6,000 tuns upward, .6 of molded depth; the molded depth under 4,000 tuns, .5 of beam, and above 6,000 tuns, .6 of beam, and the length eight times the beam.

With the midship section in the center of the length, and the weights and displacement equally disposed and balanced toward both ends, and with the proportions indicated, it would be almost impossible to make an ill-formed vessel with the most ordinary attention to symmetry. A mean between the parabolic and trochoidal form for the water lines, and an elliptic midship section, will so regulate the form that no further expression is necessary for the immersed hull. The form above water is more a matter of taste, care only being taken to make it the least possible in proportion to the body immersed, as every tun of ill-disposed material detracts from the efficiency of the whole.

The best form of upper hull appears to be the circular, or semi-cylindrical side, well rounded in at top, as giving the greatest strength with the least material; and the weight removed from the extreme breadth of upper deck, beams, stringers, &c., will give the required increase of armor plating. The form of the stem and stern should be as nearly as possible the round of the midship section. The bulwarks may be low or high, close or netted, fixed or hinged, at pleasure, but they should, in any case, be of such description as can be easily repaired on emergency.

The following table contains the dimensions and weights, in the proportions and divisions specified, of armor-clad sea-going war steamers:—

Dimensions of armor-clad screw steamers 8 beams long; depth molded 0·5 of beam up to 50-feet beam, and draught of water 0·7 of molded depth. From 50 to 100-feet beam the depth molded 0·6 of beam, and draught 0·6 of depth. Co-efficient of displacement 0·5 of parallelopiped of immersed dimensions and immersed mid section 0·8 of parallelogram. One indicated horse-power to one tun displacement:—

Displacement.	Length.	Breadth.	Depth.	Draught ex keel.	Depth of armor.	Thickness of armor.	Weight of ship and armor.	Armament, men and stores.	Machinery and coals.
tuns.	ft.	ft.	ft.	ft.	ft.	in.	tuns.	tuns.	tuns.
250	148	18·5	9·25	6 47	4·17	2·04	150	37·5	62·5
500	186	23·2	11 60	8·1	5·25	2·62	300	75	125
1,000	234	29·2	14·60	10·25	6·67	3 33	600	150	250
2,000	295	36·9	18·45	12·9	8·32	4·16	1,200	300	500
3.000	337·5	42 2	21·1	14·75	9·52	4·76	1,800	450	750
4,000	372	46·5	23·2	16·2	10·5	5·25	2.400	600	1,100
6,000	421	52 6	31·56	18·95	18·95	3·79	3,600	900	1,500
8,000	464	58	34·8	20·8	20·8	4·16	4,800	1,200	2,000
10.000	500	62 5	37·5	22·5	22 5	4·5	6,000	1,500	2 500
12,000	530	66 3	39·8	23·9	23 9	4 78	7,200	1,800	3,000
15,000	572	71·5	42·9	25·7	25·7	5·14	9,000	2,250	3,750
20,000	629	78·6	47·17	28·3	28·3	5·66	12,000	3,000	5,000
30,000	720	90	54	32·4	32·4	6.48	18,000	4,500	7,500
								equal parts.	equal parts.

The 30,000-tun vessel is the only one with side high enough for a two-decker.

Vessels under 4,000 tuns are only intended to carry armament on the upper deck in cupolas or otherwise. Above 6,000 tuns it is intended that all vessels have the gun deck under cover, the upper deck being clear for working sail and pivot guns of the largest caliber. The proportion and arrangement of the weights of the several parts of the ship and machinery and equipment are therefore of the greatest importance, and, the displacement being a fixed quantity, no latitude can be allowed in any one department except at the expense of another. For these reasons, with the midship section placed as proposed, the weight of the machinery should preponderate aft, and the armament, men, and stores forward; the coal, being the most variable quantity, should be as nearly as possible amidship, so as not to alter the trim of the ship at any stage of consumption; and the different proportions of each would be, as nearly as possible, the following decimal parts of the whole displacement:—

Weight of the vessel		·400
do	do armor	·200
do	do armament	·075
do	do men and stores	·075
do	do machinery	·125
do	do coals	·125
Total displacement		1·000

The determination of these weights is as follows:—The weight of the vessel, hull, and equipment is equal to the weight of the heaviest iron merchant ships afloat, the material of which, properly distributed, would be amply sufficient. The weight of the armor includes the weight of wood backing and fastening, and is determined by the draught of water, which, being .7 of the molded depth for small vessels and .6 for large vessels, the difference is the hight of side above water. The depth of the armor should be one and a half the side, and the thickness 0 5-inch for each foot of depth of armor in small vessels, and 2 inches for large vessels. This thickness would be maintained for half the length, and tapered thence forward and aft to stem and stern same depth and one-half of the thickness amidships; this gives sufficient protection from all shell, and nearly all shot, the reduction by taper to spare for cupolas. In small vessels it is impossible to have guns on more than one deck. If the hull, therefore, be impregnable, a tower or cupola battery will be sufficient, and the lower the hull the better. In large vessels, above 6,000 tuns, it is advantageous to have a heavy tower battery and lower-deck guns as well; but these lower-deck guns can be most efficient if the muzzle be low enough to sweep the sea and high enough to permit the breech to be lowered to an angle of 12° for elevated firing. The ports should, therefore, be as high as it is possible to secure horizontal or slightly depressed firing, and as small as the muzzle of the gun, with water-tight lids, to open only when firing. The weight of the armament and ordnance stores is entirely dependent on the fixed proportion of displacement, and cannot be increased except at the expense of some of the other qualities—it appears sufficient according to present rating. The weight of men and stores is estimated at one tun per man for six months. It need not be more, and may be less, according to the service. The weight of the machinery is assumed capable of generating and indicating, at greatest efficiency, 1-horse power for each tun of displacement, or 8-horse power per tun weight of machinery. This is not usual, but it is done occasionally, and is only dependent on the quality of material to be done regularly. The weight of coal is estimated at 2 lb. per horse power per hour, and is six days' allowance at full power, and at half-speed on long voyages would last eight times as long; but one point is especially necessary for the greatest efficiency of the machinery and the ship—the area of the propeller disc should not be less than one-half the area of the midship section (with total area of blades one-fifth of disc). This is not even attainable on the small midship section due to the proportions indicated; but a diameter 1.2 times the midship draught of water under sixteen feet gives the required area; above eighteen feet a diameter of 1.1 times will be as much as it would be advisable to take, and only requires a trim so much more by the stern instead of even keel. To remedy the usual complaint of defective steering in long vessels the area of the rudder below the load line should be one-tenth of the immersed midship section *plus* one tenth of the length. Very few of our rudders have been increased in any proportion to the great increase of length; consequently, defective steering. The difficulty of working the rudders of screw steamers must be remedied by increased power of steering gear. The diameter of the circle described in turning any vessel depends partly on the efficiency of the rudder, but principally on the proportion of the vessel's length to breadth; and the diameter of the circle of revolution is directly as the length multiplied by that proportion, so that a vessel of four beams' length will turn in half the distance that a vessel of eight beams would require. The time in which the revolution is made depends entirely on the speed, and as a vessel of eight beams will have at least one-fourth more speed than a vessel of four beams of the same co-efficient of form, and the same power, the time occupied by the longer vessel is only a half more, although the distance is double. Easy steering and a short turn are great advantages; but any screw vessel using her power throughout the circle can turn in nearly as small a space, and in much less time, than a sailing vessel of the same tunnage, and with a dead certainty that the latter can never possess, depending solely on momentum from wind to wind. Although the ability to turn in the smallest space may be in certain trades the principal requirement, it never can nor should be the principal requirement in a ship of war, although an excellent point in manœuvring. The ability of a long steam vessel to back neutralizes to a very great extent the advantage of a short vessel in turning. All our war ships should be sea-going vessels, with the light rig of an ordinary screw steamer, and as much of it iron as possible, but still sufficient for ordinary progress under canvas. There should be no lifting gear to endanger the efficiency of the screw by being shot away and fouling. Simplicity of parts is the principal element for endurance and efficiency in any mechanism so ponderous and costly as a ship of war, and this can only be obtained by dispensing with everything not absolutely essential to the steaming and fighting qualities of the ship.

POSTAGE STAMPS.—The first postage stamp was issued in London on the 10th of January, 1840, and for nine years England alone made use of it. France adopted it on the 1st of January, 1849; the Tour-and-Taxis Office introduced it into Germany in 1850, and it is now in use in sixty-nine countries in Europe, nine in Africa, five in Asia, thirty-six in America, and ten in Oceanica. Van Dieman's Land possesses its own, and so do Hayti, Natal, Honolulu and Liberia.

PUBLIC DEBT.—The representation made in some quarters that the public debt has reached $2,000,000,000, is a gross exaggeration. On the first day of the present month it was only $620,000,000, and is now less than $660,000,000. This amount includes the entire circulation and every species of notes, and between $70,000,000 and $80,000,000 debt of the late Administration, but excepts claims for which no requisitions have yet been made, but which, adjusted and unadjusted, cannot exceed $20,000,000.

© 1862 SCIENTIFIC AMERICAN, INC.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, October 30, 1862; Dr. Stevens in the chair.

CAST IRON FORTS.

Mr. REID—Mr. Chairman, I have here some models of cast-iron blocks which I have designed for the walls of forts. You see that the surface is cast with alternate depressions and projections, so that the blocks lock into each other; thus binding the whole wall together in such manner that, if one block is broken out, the wall will not fall down. Indeed, 100 feet of the wall may be undermined without bringing it down. Projectiles are now made of such weight and propelled with such velocity that, as we have repeatedly seen, granite walls are soon drilled an crumbled to pieces, and unless some better material is brought into use, the use of land fortifications will have to be abandoned. It has been proposed to face the walls of forts with wrought iron, but we all know that as wrought iron rusts on the surface, a scale of the oxide falls off, exposing another portion of the metal to the action of the air, and thus the sheet is rapidly worn away; while the scale of rust on cast iron adheres and forms a protecting coat which preserves the remainder of the mass from rust. These blocks may be built up in front of the walls of our present forts, and they may be made of whatever thickness is found necessary to resist the shot in use, and then if more powerful missiles should be introduced, the walls may be increased in thickness by raising an additional layer of blocks. Cast iron will resist a crushing pressure of 100,000 lbs. to the inch, granite about 11,000, and brick, 4,000 or 5,000.

Mr. FISHER—Can you tell us how much the velocity of projectiles has been increased within a few years?

Mr. REID—About thirty per cent.

Mr. STETSON—The range of rifled projectiles is greater than that of round balls, but the initial velocity is not as great. The greater range with a lower initial velocity is due to the greater momentum in proportion to the resistance of the air, owing to the elongated form of the projectile.

Mr. FISHER—If these blocks are cast of several tuns weight each, as proposed, the difficulty of breaking them will be very great. I recollect seeing the efforts in progress at the Novelty Works to break a mass of cast iron, which by some oversight or accident became chilled in the furnace. After trying several more rapid plans, such as dropping weights upon the mass from a great hight, some very slow process was resorted to—I do not know what.

Mr. STETSON—It was drilled in lines and split to pieces with chisels.

Mr. FISHER—It was a mass of about thirty tuns, but it did not look very large—some six feet in diameter, I should think.

Mr. STETSON—Five feet.

Mr. FISHER—Rather more than five feet I should judge.

Mr. STETSON—I measured it.

Mr. FISHER—A weight of 200 pounds was allowed to fall upon the mass a great number of times without producing any effect except making a dent. The hight from which the weight fell, I should think, was some fifty feet.

Mr. REID—Sixty feet.

ROCK OIL EXPLOSIONS.

G. TAGLIABUE—Mr. Chairman, it was proposed last week that I should bring one of my instruments here and exhibit the mode of its operation. [The speaker then proceeded to explain the operation of his instrument, as fully set forth and illustrated on page 184 of the current volume of the SCIENTIFIC AMERICAN. The claims of this invention will be found published in our regular list this week.]

Mr. BRACE—I manufactured coal-oil before the rock oils came into use, and on the discovery of petroleum, I removed my operations to the valley of the Kanawha. An old well had been sunk in that valley twenty years ago for salt, and a spring of oil was struck and thousands of barrels ran to waste. After the present excitement in relation to petroleum commenced, that old well was cleaned out, but the oil had ceased to flow. On the other hand, eighteen years ago, in boring for salt, a reservoir of gas was struck, when the drill and rods, weighing 2,400 lbs., were thrown out like a ramrod from a gun, and that gas has been blowing ever since. A gasometer has been erected and the gas is used for boiling the salt. The salt water and gas both come from the same hole, and 800 barrels of salt are made per day; the gas being sufficient to boil half of this amount.

Mr. PAGE—No fire has ever been occasioned in the country by refined petroleum. We have had fires from crude petroleum, but we shall not have these any more. The fires have been occasioned by the light oils, and now the oil is exposed at the wells in shallow tanks until these light oils are evaporated. I recently had an order for 500 barrels of light petroleum oils, and I was unable to fill the order in this city. This instrument of Mr. G. Tagliabue's was got up at the request of the heavy oil dealers to test the presence of volatile oils, and we are satisfied that it accomplishes the purpose. When the Common Council of Brooklyn had the matter under consideration of preparing an ordnance to obviate the great risk of keeping these oils, I proposed to the committee to prohibit the importation into the city of any oils under a specific gravity, but a few experiments showed that this was no indication of comparative safety. For a very heavy oil may have a small quantity of very volatile oil mingled with it, and its specific gravity will be high, and yet the volatile oil will evaporate at temperatures so low as to make the oil dangerous. The question is, at what temperature are the dangerous vapors given off; and that is shown by this instrument.

Mr. COHEN—As all of these oils give off vapors below their boiling points, only more slowly, will not these vapors accumulate when oils are stored in close cellars or rooms, and thus may we not have explosions from oils which will not appear to be dangerous when tested by this pyrometer?

Mr. CHURCHILL—That is really the objection, in a scientific point of view, to this instrument. Still, from experiments that I have made, I think the instrument will show very well the *comparative* safety of oils.

The whole evening was spent in the discussion of these absorbing topics, and the regular subject, "Paper and its Uses" was not reached. This subject was accordingly appointed for the next meeting, which is to be held a fortnight from this one, and the Association adjourned.

IRON-CLAD SHIPS VERSUS BATTERIES.

It is a little curious, in the history of new and great inventions and discoveries, to notice the changes which are constantly taking place in opinions as well as in the inventions themselves. England has been a long time ahead of us, and was perhaps the first nation of the world to construct an iron-clad frigate, but whether the honor is to be conferred upon them or upon the Emperor of France remains an open question. It is certain that this country did not so readily embrace the propositions submitted to the Government for the equipment of such vessels; and, if we are correctly informed, Mr. Ericsson's plan of revolving turret batteries was the source of much discussion and argument among our naval authorities before it was adopted. Be this, however, as it may, it is very certain that we have at present only one vessel which properly comes under the head of an armored frigate, namely, the *Ironsides*. Recent discussions in English papers show that the conclusions arrived at, from the results of the experiments at Shoeburyness, are anything but favorable to the iron-clad frigates; the targets, representing perfect fac-similes of their sides, were either smashed to atoms, or else pierced like paper; huge plates of 4½-inch thickness, backed by heavy teak 18 inches thick, were, or could have been, as the tests proved, riddled by Whitworth's guns; and this not by any means with steel-pointed, punch-headed bolts, or other mechanical devices of the sort, but simply flat-headed shells. These, upon bursting, so shattered the target, in part, that it was found impossible to use it afterward. Various other experiments, some with the heavy 13-inch gun of Horstall, resulted in practical proof that those plates, at all events, could not withstand the impact of heavy shot.

Respecting the *Warrior*, the London *Engineer* says:

"Let the *Warrior* exert her full indicated power of 6,000 horses continuously for even three days, and she makes away with about 900 tuns of coal—all she is really intended to carry; her armor then adds about two feet to her draft, or more than 100 square feet of immersed midship section, and thus diminishes her speed by two knots an hour or more. Let us think for a moment what the *Warrior* would do if she were able to steam off 14 or 15 knots an hour; would she not be more formidable than she is now? She cannot do this, however, on account of her armor; and what protection does this afford her? None whatever. A representative target has already been pierced with various projectiles fired from guns of which thousands can be made and shipped if necessary. We must not forget, in considering the question of cost, that the *Warrior's* armor cost nearly £40,000. What if a vessel without armor, but carrying thirty-six 25-tun guns, should overhaul her; might we not count upon the destruction of the great prototype of our plated ships of war?"

The same journal concludes its article by saying: "If plates cannot effectually exclude shot and shell they had better be left off altogether." So far as this relates to frigates the arguments against armor are perhaps correct enough; but do they apply to floating batteries, where the question is resolved into the impregnability of turrets, cupolas, acutely-inclined sides or other devices of a like nature? Mr. Edwin A. Stevens, of Hoboken, the designer of the battery bearing his name, says, "the object is not so much to stop the enemy's shot, as to change its direction." A frigate's side does not do this except the projectile be received either in retreat or in pursuit; it being a well established fact that we have artillery which have sent their shot through plates of five inches' thickness, backed up with wood; and instances are recorded of even greater penetration. The argument, then, resolves itself into this form, whether the limit of resistance can be arrived at sooner than the acmé of aggression. We think not, and are supported in this assertion by the results of the experiments lately tried, and which have already been published in this journal. Improvements are going forward every day in artillery, which are sufficiently demonstrative to prove to every unbiased mind that the science of ordnance which was deemed almost perfect, is, as yet, in its infancy; the mind refuses to fix any limit to the possible size, range and penetrative power of ordnance; already we have in place, and pointing seaward, guns whose immense calibers excite speculation of the most lively and entertaining nature, and we are informed that some yet larger than fifteen inches are in contemplation.

Assuming the limit of resistance to have been practically reached in the case of frigates, we may ask, not unreasonably, if such is the case with batteries? for to this form of marine or at least harbor defence we shall eventually be confined; their favorable features are so numerous, and the objections so few, that with the present experience to guide us, their pre-eminence for defence and attack, over iron-clad frigates, seems established. Whether the hull be submerged, or only partially so, the fact of their not being required to make long voyages, allows the necessary room, which would otherwise be required for coals and miscellaneous stores, to be used for plating, or like defences, which shall make them invulnerable. We confess that reflection leads us to regard the revolving turreted batteries as especially adapted to the end required, namely, impregnability. The objections which were prominent in the experimental one—the *Monitor*—as to ventilation and some other matters, have been remedied in the new ships, and they promise to be all that could be desired: the thickness of the turrets has been augmented, the guns are greatly superior, and the whole arrangement of them commends itself, viewed in the light of experience, as entirely practicable. Human foresight does not extend far at the best. Time may bring about a combination of events which shall cause us to abandon these opinions. At present we think that batteries, compared with frigates, as the best means of defence and attack, have an overwhelming advantage.

THE Pembroke (Maine) Iron Works employs 360 hands, and are in full and successful operation. The ore is brought from the New York shore of Lake Champlain. There are made annually about 6,000 tuns of bar iron, 500 tuns of rivets, and 100 casks of nails per day. They are now making rivets for Government gunboats.

© 1862 SCIENTIFIC AMERICAN, INC.

Correspondence

American Experiments with Guns and Iron-plated Targets.

MESSRS. EDITORS:—My attention has been specially directed to the SCIENTIFIC AMERICAN of the 11th of October last, containing an account of experiments made in England with a 13-inch gun, in which it is stated they had succeeded in perforating 4½-inch plates. I will give you some of my experience in the same line. By request of the Secretary of War, I conducted a series of experiments during the month of last March in the presence of an officer of the navy and another of the army. I used a 4½-inch Parrot rifled gun with four pounds of Rodman's powder to the charge. The targets were formed of iron plates 4½ inches thick, backed with 18 inches of oak timber, and were four in number. Two were constructed of the best bloom iron; one was rolled and the other hammered: the other two targets were made of puddled iron, rolled and hammered also. Every shot fired went through these targets. The rolled puddled plate was found to be the best. It did not break so badly as the plates made of bloom iron.

I have the plates in my possession now, and the effect of each shot can be seen by any person who may choose to examine them. The officers who were commissioned to witness the experiments sent a report of them to Washington. I have no doubt but our war ships are provided with such shot as I used, and I think the rebel gunboat *Arkansas* can account for one. J. H. SWETT.

Pittsburgh, Pa., Oct. 28, 1862.

English and Swiss Watchmakers.

MESSRS. EDITORS:—In the London Exhibition the competition between the English and Swiss watchmakers is very keen, and the former admit the superior taste of the latter. The following I have taken from an English criticism on the exhibition:—The object which the Swiss watch manufacturers have pursued is not so much that of precision of work as the supply of a moderately useful time-keeper, attractive in its exterior and low in price. For the principle of mechanism they are indebted to the patient thought of the English workmen, while they have in return, exercised a beneficial influence on the trade by the invention of machinery for facilitating the work, and reducing into elegant proportions what we had only known as a necessary incumbrance. . . . The competition which the Swiss manufacturers maintain against ourselves, both here and in our own colonies, is greatly assisted by the more scientific education in the principles of mechanism which the foreign artists enjoy. . . . . It is a matter worth the attention of the trade, whether a school for the instruction in the principles of mechanism and the elements of the fine arts might not with advantage be instituted among our own watch manufacturers. Under such favorable circumstances the competition of Swiss manufacturers would be less formidable. As one of the features of the trade abroad, it may be remarked, that the female part of the population are very generally engaged in it, and they receive for their work equal wages with the men. Many departments of the business are well suited to their abilities.

A very fierce conflict rages between the English and Swiss manufacturers concerning the lever watch alone. The Swiss desire five vibrations to the second, and consider it an improvement as to accuracy over four vibrations per second. The English want to do away with the liability to stop, and they therefore adopt a weak hair spring. They believe that by increasing the tension of the hair spring they can compete with five vibrations, and so they have taken up their position on these issues. J. MUMA.

Hanover, Pa., Oct. 28, 1862.

Crab Apple Cider and Blackberry Wine.

MESSRS. EDITORS:—I expect in about a week to have a barrel of crab apple cider, which I wish to bottle in imitation of champagne. Can you give me a receipt for preparing it for bottles, or can you inform me where I can get a book that will give me the desired information?

From your receipt for making blackberry wine I have for two years past supplied myself with a most delicious beverage. That receipt alone is worth more than the year's subscription to the SCIENTIFIC AMERICAN. H. WINCHESTER.

Frederick, Md., Oct. 31, 1862.

Salt-making---A Successful Invention.

MESSRS. EDITORS:—In accordance with my promise I am happy to announce to you the ultimate success of my new patent salt block, which you have so accurately illustrated on page 97, present volume of the SCIENTIFIC AMERICAN. The method turns out to be the most perfect compliance with the requirements of the brine of anything yet tried, both in quality of salt and economy of manufacture. Imperfectly and cheaply as it has been constructed, like most of the first specimens of new inventions, the yield of salt is 30 barrels, or 150 bushels in 24 hours, from the use of 3 cords of good wood; which will be increased to 40 or 50 barrels per day, without doubt, from the same amount of fuel, on adding to the length of the building, so as to use an 80-feet furnace and flue instead of a 50-feet one, which we are now using. This is a part of the original plan which has been delayed for the safety of investment and to insure a good draft in long-submerged flues as we proceed, and which proves to be very practicable.

The effect of the invention amounts to a saving of over one-third of the fuel and labor, and about one-third of the expense of the erections, over and above the old kettle system; besides, the purity of the salt cannot be over-estimated by all consumers of salt, it having been manufactured without the use of lime in any way or shape, the oxide of iron having been extracted by the same heat that brings the brine to salt, and all other impurities which are so deceptive to the mass of consumers, such as chloride of lime, sulphate of lime and carbonate of lime, which are natural in the brine, and the alkali of the lime used for extracting or precipitating the iron formations, all of which are as white as the salt itself, and as deceptive to the purchaser as a snake in the grass; yet all are extracted by the same heat and the steam that rises from it, in one combined process.

NATHAN CHAPIN, Patentee.

East Saginaw, Mich., Oct. 28, 1862.

Ice Machine Wanted.

MESSRS. EDITORS:—I have seen your notice on ice-freezing machines; be so kind to let me know the price of one making about two tuns per day, the size and thickness of ice, &c., with all particulars. If you have not time, please hand the letter to the proprietor. I am inclined to think, from what I have read, there could be no better investment than in one of those machines; let me hear from you by earliest opportunity. ISAAC MCKIM COOKE.

Panama, New Granada, Oct. 23, 1862.

[We do not know of any one who is engaged in the manufacture of ice-making machines, but it appears to us that the discovery of such a machine opens a wide and profitable field for the application of ingenuity. The demand for a simple and efficient machine of the character would be very great.—EDS.

Facts for Vegetarians.

It is indeed a fact worthy of remark, and one that seems never to have been noticed, that throughout the whole animal creation, in every country and clime of the earth, the most useful animals that eat vegetable food work. The all powerful elephant, and the patient, untiring camel, in the torrid zone; the horse, the ox, or the donkey, in the temperate; and the reindeer in the frigid zone, obtain all their muscular power from nature's simplest productions—the vegetable kingdom. But all the flesh-eating animals keep the rest of the animated creation in constant dread of them. They seldom eat vegetable food unless some other animal has eaten it first, and made it into flesh. Their own flesh is unfit for other animals to eat, having been itself made out of flesh, and is most foul and offensive. Great strength, fleetness of foot, usefulness, cleanliness, and docility are, then, always characteristic of vegetable eaters.

Exclusion of Damp from Brickwork.

The following methods for obviating this evil have been described at the Royal Institute of Architects. Three-quarters of a pound of mottled soap are to be dissolved in one gallon of boiling water, and the hot solution spread steadily, with a flat brush, over the outer surface of the brickwork, taking care that it does not lather; this is to be allowed to dry for twenty-four hours, when a solution formed of a quarter of a pound of alum dissolved in two gallons of water is to be applied in a similar manner, over the coating of soap. The operation should be performed in dry, settled weather. The soap and alum naturally decompose each other, and form an insoluble varnish which the rain is unable to penetrate; and this cause of dampness is said to be effectually removed. The other method consists of sulphurized oil as a varnish or paint, and is said to improve the color of brick and stone, as well as preserve them. It is prepared by subjecting eight parts of linseed oil and one part of sulphur to a temperature of 278° in an iron vessel. It is said to keep out both air and moisture, and prevent deposits of soot and dirt, when applied with a brush to the surface of a building or stone, or even of woodwork.

A Steam Fire Engine for New Brunswick.

A committee from the city of St. John, New Brunswick, recently arrived in Boston, for the purpose of purchasing a steam fire engine. The committee visited the house of steamer No. 10 in Charles street and witnessed her working qualities. In four minutes from the time of starting the fire she had on 10 lbs. of steam; 20 lbs. of steam in 5½ minutes—playing two streams of 1¼ and 1-inch. She played two streams vertically 150 feet; and one stream, through an inch-pipe, 170 feet vertically. The committee were so well pleased with what they saw that they left for Manchester to order a similar one from the Amoskeag Manufacturing Company, of Manchester, N. H.

Relics of the War.

We saw lately, in this city, a lot of muskets from the battle-fields, which told volumes of the scenes they had passed through; lockless some, stockless others, and useless all; with their bent, battered and twisted barrels, they lay stern and silent monitors of the havoc of war; just as those who once wielded them, lay cold and stiff in the arms of death; the sacrifice Freedom gives for the expression of her opinions. Yet such is the economy of the world that these apparently useless fragments are returned to be again worked into shape, to be again grasped in patriots hands, and doubtless again shattered into countless pieces.

Cements for Joints of Petroleum Stills.

Take 6 lbs. graphite (black lead), 3 lbs. of dry slacked lime, 8 lbs. of the sulphate of barytes and 3 lbs. of boiled linseed oil, and mix them thoroughly together. The solid materials must be reduced to fine powder before being stirred among the linseed oil. If the above quantity of oil is not sufficient for making the cement sufficiently thin, add more until the proper consistency is obtained. Linseed meal cake reduced to powder and mixed with water so as to make it into a paste makes good lute for stills which are not subjected to a temperature above 160° Fah.—*Oil Springs Chronicle.*

THE Council General of the Department of War has agreed to an address to the French Government calling for a heavy tax on absinthe, the basis of which (to use the chemical term) is prussic acid, and which is indulged in to such an excess by Frenchmen of every class, but particularly by military men, as to seriously affect their health. The prevalence of insanity among the officers of the French army quartered in Africa, is described to this deleterious drink.

LOTS OF MONEY.—The New York *Independent* estimates that there are two hundred millions of dollars idle in the banks of New York city. This vast sum is waiting and watching the movements of our army.

The *Oil Springs Chronicle* says that refuse petroleum is being used in that place for fuel, with great success. The saving in coal and wood is said to be immense.

A RAILWAY has been built in New Zealand about 14 miles in length, rising in that distance 2,800 feet.

© 1862 SCIENTIFIC AMERICAN, INC.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE---PROGRESS OF PRACTICAL MECHANICS.

The British Association for the Advancement of Science met at Cambridge on the 2d of October. The section of Mechanical Science was presided over by William Fairbairn, F. R. S., who delivered an interesting address on the progress of mechanical science, from which we extract the following respecting the machinery in the London Exhibition :—

A very casual glance at this Exhibition, when compared with that of 1851 and that of Paris in 1855, shows with what intensity and alacrity the public mind has been at work since the people of all nations were first called upon to compete with each other in the peaceful rivalry of mechanical art. As one of the jury I examined with care and attention the whole of the mechanical inventions and machines in the International Exhibition. There is no new discovery of importance, except that the machines are more compact and better executed than at any previous exhibition. Taking the Exhibition as a whole, there is no very great, nor very important, discovery in mechanical science, but there is a great deal to be seen of a character both interesting and instructive. In land steam engines there is nothing particularly attractive, if we except the growing importance of the horizontal, which is rapidly supplanting the beam or vertical engine. To the horizontal system may be applied economy in the first cost, and nearly equal efficiency in its application to mills and for manufacturing purposes. Another important feature in these engines is their smooth and noiseless motion, their compact form, and the facility with which they can be applied as helps or assistants, to those of larger dimensions. They are, moreover, executed with a degree of finish and accuracy of workmanship which cannot easily be surpassed. In the agricultural department the same observations apply to this description of engine, where it is extensively used on a smaller scale. They are equally well made, and the country at large are chiefly indebted to our agricultural engineers for many ingenious contrivances and for their successful application, not exclusively to the farm, but to many other useful purposes in the economy of rural life. From the motive power employed in our manufactories and its adaptation to agriculture, let us glance at the beautiful execution, compact form, and colossal dimensions of our marine engines. Those who have examined the specimens of Mr. Penn and Messrs. Maudslay and Field in the International Exhibition must have been struck by the beauty and exactitude with which these engines are manufactured. In this department of construction we are without rivals, and this country, as the first maritime nation in the world, stands pre-eminently first as the leader of naval propulsion. In locomotive constructions we are not behind, if we are not in advance of other nations. It must be admitted that several splendid specimens of engines from France and Germany are exhibited by some of the best makers of those countries. There is, however, this distinction between the continental locomotives and those of home manufacture, and that is, in this country there is greater simplicity of design, greater compactness of form, and clearer conceptions in working out the details of the parts. These operations, when carefully executed to standard gages, render each part of an engine a fac-simile of its fellow, and hence follows the perfection of a system where every part is a repetition of a whole series of parts, and in so far as accuracy is concerned, it is a great improvement on the old system of construction. In the machinery department, although there is nothing that strikes the observer at first sight as new, yet there are many useful improvements calculated to economize labor, and facilitate the operations of spinning and weaving, and in tool-making there never were at any former period so many hands and heads at work as on the occasion pending the opening of the Exhibition. I do not believe that at any former period there has been such an exhibition of machines and of tools which are the creators and makers of the machines themselves. Some of the tools, such as the turning, boring, planing and slotting machines, are of a very high order, and the tool machinery for the manufacture of fire-arms, shells, rockets, &c., is of such a character as to render the whole operations, however minute, perfectly automatic or self-acting, with an accuracy of repetition that leaves the article when finished identical with every other article from the same machine. Such, in fact, is the perfection of the tool system as it now exists, that in almost every case we may calculate on a degree of exactitude that admits of no deviation beyond a thousandth part of an inch. Among the many interesting mechanical objects exhibited in the two annexes may be noticed as original the spool machine for the winding of sewing thread on bobbins; the machine for making paper bags, invented by a pupil of my own; the saw riband machine, and others of great merit as regards ingenuity of contrivance and adaptation of design. In manufactures, in design, and in constructive art there is everything that could be desired in the shape of competitive skill.

ECONOMIZING FUEL IN WAR SHIPS.

Mr. Edward Ellis Allen, of London, read a paper on "The Importance of Economizing Fuel in Iron-plated Ships of War," and described a new double expansive marine engine, constructed according to his patent by Messrs. J. and G. Rennie; exhibiting photographs of the same, taken at their works. The author pointed out in detail the principles of marine engine construction which experience had shown to be absolutely essential in order to economize the fuel, viz., full expansion of the steam, surface condensation, superheating the steam, heating the feed water, jacketing the cylinders, and proportionately increasing the boiler power; and contended that in the ordinary marine engines now fitted to the iron-plated ships, though by the best makers, and of the most admirable workmanship, economy of fuel was impossible. The necessity of largely increasing the cylinder capacity to admit of expansive working, rendered an entire change in the forms of marine engines imperative; the large diameter short-stroke engines of the present day consuming as much as 4½ lbs. of coal per indicated horse power per hour; whereas double expansive engines, on the plan suggested, and every way suited for Government vessels, would save fifty per cent of the present consumption of fuel. The amount yearly voted for coals for the navy now exceeds £300,000 per annum, and the author stated it as highly probable that it would rise to upward of a million sterling, when our iron-cased fleet was complete, unless changes were made in the construction of engines employed in war steamers. The engines referred to had been frequently submitted to the Admiralty.

Mr. Scott Russell said they were all agreed that the short-stroke engine was wasteful of fuel in marine engines, and of the powers to gain speed The importance of saving fuel to the Admiralty was so great that they ought to take the lead in experiments for this purpose. Without saying that Mr. Allen's invention was the best that could be devised, he would say that the combination he suggested offered considerable hopes that an economy of fuel would be attained without reducing the work performed by the engines.

The President said he had always found that experimental tests in working steam by expansion were always more successful than they were found to be in the actual working. Unless, therefore, the experiments were carried out on a large scale and on a long voyage, and an average obtained, they could not be considered altogether satisfactory.

Mr. James Nasmyth described his solid bar valve motion, which as an improvement on the ordinary "link" valve motion was found most successful, and, since he contrived it in 1852, had been introduced with great success by Mr. Humphreys, as might be seen in his magnificent marine engines at present in the International Exhibition.

A NEW BOILER.

Dr. F. Gramaldi read a paper on "A New Marine Boiler," the principle of which was that the whole boiler, which consisted of a cylinder nearly filled with tubes, was kept slowly revolving during the time of working. Detailed drawings were exhibited of a boiler of 100-horse power, which occupied less than half the space of ordinary marine boilers of the same power, and was of less than half the weight. The firegrate, placed beneath the boiler, has the whole shell brought gradually over it, the hot gases passing through all the tubes, part of these being covered by the water and part in the steam space, thus rendering the boiler a steam generator and a superheater.

In the discussion which followed, and in which Mr. Siemens, Mr. Allen and Mr. Scott Russell took part, the general principle of the boiler was fully approved, and it was stated that Mr. J. Stewart, of Blackwall, was about to construct one suitable for a steam vessel.

[Such a boiler was illustrated and described on page 217, Vol. II. (old series) Scientific American. —Eds.

A New Transit Instrument in San Francisco.

The following is from Mooney's (San Francisco) *Express*:—

The new transit made for the city engineers by Mr. John Roach, optician, Washington street, is much larger than any of the old instruments, whether of London, Paris or New York make. The divided circle of the transit is thirteen inches diameter, whereas, those previously known to surveyors seldom exceeded six inches. The old instruments had 720 cuts, and one or two verniers, reading to a single minute. The Roach transit has 3,420 cuts, three verniers, reading to five seconds. There is a nineteen-inch telescope hung to the open axis of the instrument—this is the "tell-tale" glass, which gives with great exactitude the initial point on one hand and the object on the other. A second telescope is mounted on the top of the instrument, which revolves, and admits of a vertical or horizonal adjustment, and enables the operator to take the angle of elevation or depression, with a vernier divided to read to five seconds, the same as the horizontal limb. These telescopes are double the length of the old fashioned ones. There are four levels instead of two upon the pan of the instrument. The instrument has been constructed by the aid of an unerring dividing engine made expressly by Mr. Roach; and it enables the surveyors who shall use it, to detect an error of two inches in an area of five miles. This instrument will prove invaluable to the city engineers, in laying off streets and determining rights to property.

[We doubt not but Mr. J. Roach has constructed an excellent transit, but our cotemporary seems to be unaware of the large and accurate instruments which have been made, and are in use in this part of the world. Ten years ago, E. and G. W. Blunt, of this city, furnished the Coast Survey with a transit which had a circle of 24 inches (11 inches larger than the one in San Francisco), and there are instruments in Washington which have 20-inch circles. A theodolite made for the Coast Survey in this city closes up its work to the $\frac{2}{10}$ of a second. The use of two telescopes on such instruments appears to be a superfluity, as Mr. Edmund Blunt, who has perhaps made more triangulations than any other person in the country, only uses one telescope, and he has exploded the idea that two are necessary.—Eds.

Concussion of Large Guns.

The following account is taken from the correspondence of one of the city "dailies" :—

Several wooden spittoons were lying together near an 8-inch Dahlgren when it was fired, and the concussion of the air broke every one of them to pieces. Boats are not allowed to hang on the cranes above the guns when firing is going on, as it would take their bottoms out. They are invariably lowered far underneath the guns. An officer assured me that he watched a heavy shell passing the corner of the gable of a dwelling and it took the adjacent part of the roof clean off, without touching it, by the commotion of the air.

While I was aboard the *State of Georgia* the great 15-inch Dahlgren gun was fired in process of testing. The missile in this instance was a 380-pound shell, fired point blank. The gun was aimed to skim or bound over the surface of the water and ricochet, as it is technically called. The shell went off in plain sight, making tremendous leaps from point to point on the surface of the water for nearly three miles, like some maddened electric fiend broke loose. The solid shot for this gun is said to weigh about 560 pounds. Two men put in the cartridge and five men the shell.

© 1862 SCIENTIFIC AMERICAN, INC.

Improved Rotary Pump.

From the days of the old oaken bucket down to the present time, and from even a more remote period, inventors have labored to produce a machine that should draw or force liquid from or to a distance with the least expenditure of power and the simplest arrangement of parts. Pumps of all kinds have had an amount of research bestowed upon the principles which control them that has been amply repaid by their increased efficiency. The one herewith illustrated is of the rotary class, and is well designed in the various parts. It consists of the usual chamber and piston, together with the gearing necessary to operate the same.

A is the chamber cast in two pieces and afterward bolted together. B is the feeder which conducts the fluid down to the piston below. *a* is the bearing frame, and *b* the piston rod or shaft which drives the whole pump; these constitute all the details in this part of the invention. In Fig. 2 a section of the chamber and piston is shown, as also the construction of the spiral eduction passage, and the apertures, *c*, of the feeder; the end of the shaft, *b*, sets in a step cast in the lower half of the case, which is not shown in the engraving. The feeder, B, has apertures in it which are equal in number to the arms of the piston, into which they open, and with which the feeder revolves; the arrows showing the direction of the liquid in its passage. The arms of the piston are curved in a direction contrary to their motion, and also upon their upper and lower faces —this gives a circularity and roundness to the current, corresponding in shape to the spiral passage and greatly facilitating its expulsion; the openings in the feeder are likewise constructed with this object in view, their several throats being so curved as to deflect the liquid easily and gently, in a steady flow through the case. By the rapid rotation of the piston, and the action of the current through the feeder channels, the piston and shaft are raised slightly, and the case thus relieved of their weight.

Fig. 1

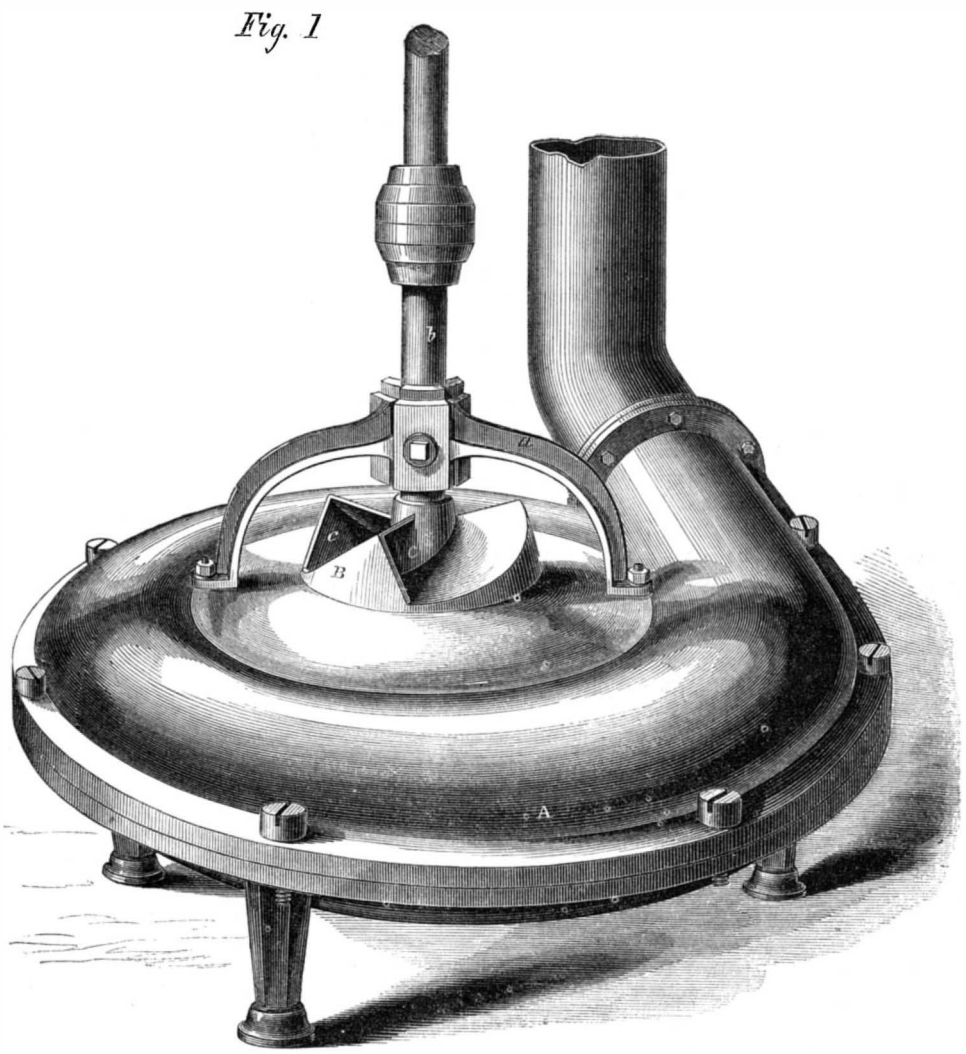
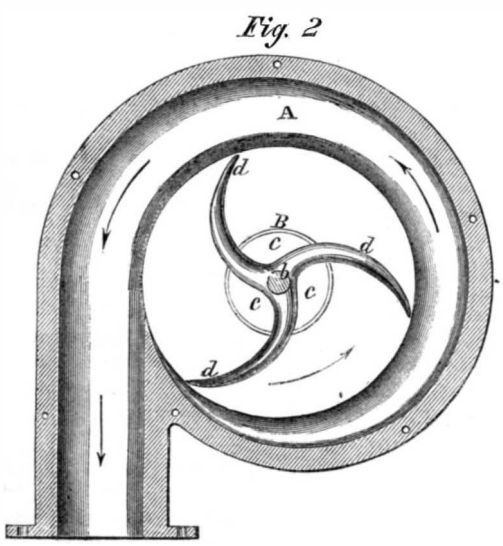


Fig. 2



It will be seen that the absence of valves, which are in most cases objectionable, very much simplifies the construction, and also permits of an unbroken and steady stream through the pump when in action. All foreign matter, such as the sediment which collects in the bottom of brewers' tanks, to which purpose the pump has been applied and found to work perfectly, is, by the peculiar position of the feeder and the arrangement of the passages, readily expelled; were the induction at the base as in some other pumps, its operation would be impeded. The inventor states that a pump of this character, with a three-inch discharge, will raise seventeen barrels of water a minute from a depth of 32½ feet, revolving at the rate of 400 turns per minute.

The patent for this invention was procured through the Scientific American Patent Agency, Sept. 30, 1862. Further information concerning it can be obtained by addressing the inventors, Messrs. Eli Perry and John Boley, at Baldwinsville, N. Y.

PERRY & BOLEY'S ROTARY PUMP.

THE "DAILIES" ON BIG GUNS.

The New York *Times* and the *Herald*, of the 27th ult., contain articles on big guns, and if both are to be credited the public will just be as wise on the subject as if they never had been published, because they contradict one another point blank. The author of the article in the *Times* states that a ball fired from an Armstrong 150-pounder, moving at the rate of 1,770 feet per second, has twice the penetrating power of a 425-pound ball fired from a Dahlgren 15-inch gun, moving at the slow rate of 800 feet per second, because the penetrating power is according to the square of the speed. He states that our large cast-iron guns are not so strong as the the British steel and banded guns, and points to the fact that the 11-inch guns on board of the *Monitor* were only fired with 16-pound charges, and that they were afraid to risk solid wrought iron shot in them. He states that for the 15-inch new guns, carrying 425-pound shot, 50 pounds of powder is the charge; whereas the *Mersey* 13-inch gun has been fired with 74-pound charges.

The *Herald* states that Captain Dahlgren puts 11-inch spherical shot through 4½-inch iron plates as readily as Delamater puts the steel punches through the hull plating of the *Dictator*, and that when all our iron-clads are armed with 15-inch guns, their shot with a moderate charge, will not only pierce but shatter the slight armor of the *Warrior*. The *Times* takes the opposite position, and asserts that penetrating power is not the work of large bores and low charges, but great velocities obtained by large charges. It also asserts that the sides of such a vessel as the *Warrior* are well adapted to resist the crushing effect of large shot having a low velocity, because they are constructed of elastic wood combined with the iron plates.

The *Times* considers the Blakely hooped gun, which is similar to the American Parrot gun, to be the best. But the most prodigiously profound critic of all, on guns, is the London *Times*, which, in a long leader on Oct. 6th, declares that a gun of 95 cwt.—less than 5 tuns—is the heaviest that can be worked with success, or even safety, on board of a floating vessel. It consoles its readers with the assertion that the British iron-clad vessels are safe against all other war vessels, because the big guns which can pierce them must be mounted on *terra firma*—in forts. What ignorance of facts to be put forth with such oracular assumption! The 15-inch gun on the *Passaic* weighs 42,002 pounds—nearly 18¾ tuns. All the new turret iron-clads are to be armed with such ponderous weapons. According to the London *Times* the Britishers must be an age behind the Americans in handling big navy guns.

A Land "Monitor."

Mr. Redstone, of Indianapolis, proposes to build, for Government, 9 "Land Monitors," or "engines of war," to cost $900 apiece, to weigh 1,800 lbs. each, 25-horse engine and all, with coal, water, ammunition, knives, &c. including the above weight; each to be handled by two men; to discharge from each 10,000 shots in half an hour; to be capable of running twenty miles an hour over any grade less than 45°, to be perfectly manageable in turning, climbing or descending; to clear more obstructions from artillery roads than 500 men; to reap the rebels clear by divisions; to resist canister, grape and small shot. The inventor (Mr. Redstone) says:—"I propose to engineer the advance car myself; to risk all the Government can risk—my life—each man in the nation can only do this. I also propose to furnish patterns of the engine, free of cost, on our plan. Now, if any doubt my ability to accomplish the above, I refer them to what I have accomplished in mechanical invention. If any doubt my sincerity, I only answer I have too deep sympathy for the cause of my country to propose anything I am not willing to execute."—*Railroad Gazette.*

IMPORTS OF FOREIGN IRON.—The *Engineer* states that a large number of orders are being received from North America for general descriptions of iron, notwithstanding the rate of the exchanges and the high tariffs. Iron is now being taken from Liverpool to New York for 4s. sterling per tun.

AT a meeting of manufacturers of metallic springs, held at the Astor House, this city, recently, we learn that a resolution was adopted to increase the price of springs one per cent on the pound.

© 1862 SCIENTIFIC AMERICAN, INC.

The Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY
At No. 37 Park Row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum—One Dollar in advance, and the mainder in six months
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
☞ See Prospectus on last page. No traveling agents employed.

VOL. VII. NO. 20....[NEW SERIES.]....*Eighteenth Year.*

NEW YORK, SATURDAY, NOVEMBER 15, 1862.

SEVENTEEN THOUSAND PATENTS SECURED THROUGH OUR AGENCY.

The publishers of this paper have been engaged in procuring patents for the past seventeen years, during which time they have acted as Attorneys for more than SEVENTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,
No. 37 Park Row, New York.

THE CONTROL OF STEAM BOILERS.

The control and management of steam boilers is one of the most important duties devolving upon those who have the supervision of steam machinery. To paraphrase an old proverb, it may not incorrectly be said: "Take care of the boiler and the engine will take care of itself." Although this advice is by no means to be strictly interpreted, it serves to illustrate the force of our argument, which is, that all the attention and care that can be given to the subject in question will be amply repaid. The boilers are the seat of force and develop the power required; into their doors, as into the crucible of the refiner, enter directly the gold and silver of the proprietors. In the proper management of it and in rendering a full equivalent therefor, lies the whole art and secret of successful management. It has been asserted that boilers are in too many cases overtaxed, and our observation and experience convinces us of the truth of this statement. In numberless instances we have seen boilers where the crown sheet was most inadequately stayed to the shell; the crow feet being eighteen inches apart or more, the braces few and insufficient in size, the socket bolts mere pins, and the water spaces altogether too narrow to admit of a thorough circulation of the feed-water. A boiler in the condition thus described carried a nominal pressure, according to safety valve weight, of 75 lbs.; upon attaching a gage and testing the actual pressure it was found to exceed this figure by nearly 20 lbs., per square inch, showing of course an error in calculation. Some time afterward we examined this same boiler and found the crown sheet forced down fully an inch from a true plane; it was no more than was to be expected under the circumstances, and we cite the above instance as one fresh in our mind of imperfection, where safety and economy ought to be assured beyond doubt.

Boilers are much neglected; because they have no outwardly visible joints, pins, or other mechanical attachments, they are slighted and left to take care of themselves. But the difference between one well cared for, and one neglected, is just as apparent to the practical eye as it is in the engine. If on opening the furnace doors we find the flues or tubes half full of ashes and cinders; if upon removing the hand hole plates, the water spaces in the legs and front are found obstructed and a heavy deposit of sediment, scale, mud or refuse of any sort choking up the various passages, we have the most incontrovertible testimony that the engineer is unfit for his place, and that he is daily jeopardizing the lives of those in his vicinity and ruining his employers' property. The above combination of details is not by any means unlikely to occur; nearly all practical men will bear us out in this assertion, and will call to mind similar cases that have come under their own observation. When the daily duty of a boiler is once ascertained, it is easy to limit its performance within certain bounds. If a pressure is required of 75 lbs., carry that amount; not 85 one hour and 65 the next; that would show carelessness in firing. If the construction of the boiler demands that the feed should be kept up to the second or third gage, keep it there, don't let it rise and fall above or below, one or the other; that involves a waste of coal. Pumps in good order force, if the reservoirs be full, an equal quantity at every stroke of the plunger, and we can readily understand how the feed being once regulated will go on in its daily routine with as much certainty as any other well kept apparatus. These matters will doubtless seem trivial and unworthy of notice, but it is through attention to details that great results are achieved. It is no controversion of our argument to say that, because a boiler has not exploded or does not explode while the vices above-mentioned are daily carried on, care and supervision are thrown away. Even if an immediate and terrible disaster does not occur, it is not through any merit of those who expose the boiler to such danger. In any event costly property is greatly deteriorated and money shamefully wasted by carelessness and want of attention to the various minutiæ which make up the grand total of skill in engineering. Every engineer may learn something from unskillful persons; he may see in their want of attention to these grave matters what loss of property to the manufacturer and what ruin of reputation to the engineer is involved through shiftless and wasteful habits.

WHY MONEY IS WORTH ONLY FIVE PER CENT.

There is no class of questions which excite more universal interest than those which relate to the acquisition, distribution and accumulation of property, and among these questions one of the most important is that of the causes which determine the rate of interest. These are perfectly simple, and are easily understood if we take the trouble first to understand what it is that is borrowed and loaned in the market as capital.

If we step into the office of Robbins, the great note broker in William street, we shall see retired merchants and others coming in from time to time during the day, and looking over the notes and acceptances which have been left with him for sale, and when they find the note of a firm which they think is sure not to fail, some of them will, if the rate is satisfactory, purchase the paper; in which case the clerk reckons the discount, and the buyer gives his check for the balance. Let us trace this operation and see what it is that passes hands.

In the first step it is doubtless money. The maker or owner of the note delivers it to the buyer, who pays for it either in money or in his order to the bank where his money is deposited. In this, as in other operations, a sufficient amount of money is employed to effect the exchange of values. But if we look a step further, we shall discover that the great bulk of capital which has been borrowed and is bearing interest now exists in the form of cloth, beef, machinery and other commodities. The rate of interest, therefore, is determined by the relation between the supply and demand of capital in all its forms—in merchandise generally—the quantity of coin and bank notes in circulation having very little influence upon it.

In 1849 the writer of this heard a lecturer explaining that the gold mines of California where to make money so abundant that the taking of interest would be abolished; but when the same lecturer arrived in San Francisco, he found that the current rate of interest on perfect security was ten per cent a month. Though money was more abundant in proportion to the wealth of the people than it ever was in any other community in the world, the total capital—embracing all its forms—was very scarce, and the demand for it was very great. The country was filled with men who had not succeeded at the East, and who were consequently poor, while the extraordinary resources of the State furnished unusual opportunities for the profitable employment of capital. Capital in any other form as well as that of money commanded a large revenue for its use. A rocker that cost $30 would rent for $1 50 per day, and a lot of ground that was offered for sale at $225, commanded a rent of $40 per month.

We shall find in other places a corresponding relation between the rent of land, buildings, machinery, &c. and the rate of interest on money. Indeed, when a man hires money, what he really wants the use of is some other form of property. If a manufacturer leaves his note at Robbins's for sale, or offers it at a bank for discount, though he obtains money in the first instance, he presently exchanges this money for machinery, or raw material, or some article to use in his operations. These articles perform the office of tools in his hands, enabling him to produce a larger amount of value, and thus to pay for the use of his capital. If a merchant hires money, he uses it for the purchase of merchandise, by which he is enabled to do a larger trade and make larger profits, and thus he can afford to pay for the use of the capital. Neither the manufacturer nor the trader could afford to hire money and keep it in the form of money. In this shape it would not earn its interest.

The great mass of capital which is at interest in the country exists, therefore, in the form of merchandise, and the rate of interest depends upon the relative supply and demand of the aggregate capital.

The supply of capital is furnished by all who live within their incomes, and therefore depends mainly upon the provident dispositions and habits of the community. The demand for capital comes from the enterprising and active men in the community who discover profitable modes of employing it. The rate of interest at any time depends upon the relative power of these two classes; as would be anticipated, this is constantly fluctuating. At the present time in the city of New York it is five per cent.

VISITS TO OUR MACHINE SHOPS—THE ALLAIRE WORKS.

Among the many large shops in this city, for the manufacture of all kinds of machinery, the Allaire Works holds a prominent position. Since 1819, when these Works were first incorporated, they have been steadily occupied in building marine and stationary engines that have created for them the most enviable reputation. Some of the most celebrated ships, in point of speed and economy, have had their engines put in at the Allaire Works. Here was built the famous *Vanderbilt*, the *North Star* and the *Baltic*, or one of her sister ships, comprising the old Collins' line; and others, whose histories are not familiar to the public generally, have had their massive engines constructed at these Works, from the conception of the design to the fastening of the last rivet in the wheel-arms. The proprietors are at present very busy with their various contracts, of which we give a list, adding previously, however, that some 800 men are now employed upon them.

The frigate *Lackawanna* is receiving a few finishing touches, being nearly ready for sea; her engines are similar in design to those of the *Adirondack*, which was lately lost off the Florida coast; the cylinders are 42 inches diameter with a mean pitch of 17½ feet. The boilers are Martin's patent, with 8,950 feet fire surface. The usual blowers and engines are also being furnished to her.

For the Norwich freight line a beam engine of 54-inch cylinder by 11 feet stroke, and furnished with Sickles' improved cut-off, is building; the wheels are of wood, 32 feet in diameter by 7½ feet face; it has one boiler of Erastus Smith's patent, a combination of flues and tubes, with a double row of furnaces. Also one engine for Sanford's line, 56-inch cylinder by 11 feet stroke, similar in detail to the above.

Two inclined engines for side wheel gunboats, 58-inch cylinder by 8 feet 9 inches length of stroke, with overhung iron wheels of 26 feet diameter and 9 feet face, with Martin's patent boilers, Sewall's condenser and the blowing engines for the boats, are also in hand.

One beam engine for C. Vanderbilt, Esq., 80-inch cylinder by 12 feet stroke, with iron wheels 33 feet

© 1862 SCIENTIFIC AMERICAN, INC.

diameter, 8 feet face, and two horizontal tubular boilers with 9,000 feet of fire surface, is also being constructed.

These are all the new contracts now building except six gun-carriages for the Ericsson batteries, and the massive machinery for the huge iron-clad ship *Puritan*, now being laid down in Mr. Rowland's shipyard, Greenpoint. These are two cylinders of 100 inches diameter by 4 feet stroke, and are among the largest screw engines in the world, exceeding the *Grand Admiral* and *Great Eastern* by 16 inches in the diameter of the cylinders alone; the latter vessel however, has four instead of two, as is the case with the *Puritan*. One of these cylinders is already bored and the flanges faced; the other had, at the time we saw it, but just been lifted from the pit wherein it was cast; it will soon take the place of the one just finished in the mill, the other parts, slides, valves and rods, are in a forward state and their completion is being hastened as much as possible. Fuller details of the engines will be given soon. Twenty-three tuns of metal were melted for the cylinder casting alone. Some vessels have also just been completed by these Works and repairs are going forward on others. The Haytian man-of-war—*Twenty-second of December*—is receiving a general overhauling.

The engine of the *New World* is being adapted to the steamer *Dictator* now at Mr. Englis's yard, Tenth street (E. R.), and the steamers *Columbia*, *John Brooks*, *Vanderbilt* and *North Star* are having general repairs made throughout. Two engines, formerly in service upon the western lakes a short time, are being transferred to some new vessels building for the New York Steam Navigation Company.

At their works at the foot of Eleventh street (E. R) the company are building the Whitney battery, *Moodna*, which is being pushed forward as rapidly as possible. Through all parts of the establishment the greatest vigor and energy are observable; and the sound of hammers and the laboring of the machines over their ponderous loads create the impression on the mind of the beholder that here at least nothing is neglected that skill and experience can suggest toward building up a navy which shall be at once a source of pride to the country and a terror to its enemies.

THE VELOCITY OF STEAM AND AIR UNDER PRESSURE.

Having had frequent inquiries lately respecting the velocity with which steam and air flow into a vacuum, and into the atmosphere under pressure, we will present the laws relating thereto, and other information on the subject. Gases, air and steam, being expansive fluids, come under the same consideration. The method of estimating their velocity under pressure, is founded on the laws of falling bodies, and is a simple application of the laws of gravitation. Thus if a ball of metal is dropped from an elevation, it falls 16 feet in one second of time, and at the end of that second, it has acquired a velocity of 32 feet. The next second it falls 48 feet, so at the end of two seconds it has fallen 64 feet. If the times are represented thus for five seconds 1″, 2″, 3″, 4″, 5″, the spaces fallen in each second will be as 1, 3, 5, 7, 9, and the spaces fallen through in the whole time as 1, 4, 9, 16, 25—the squares of the time. This proportion holds good for any time or space through which a body falls in vacuo. The velocities are as the times of descent, and the spaces fallen through are as the squares of the times, consequently the velocities are as the square root of the hights, or spaces through which a heavy body, like the ball of metal, falls. As gravitation therefore produces a velocity of 2 in descending through the space 1, the hight in feet through which a body falls being multiplied by 64, will give the square of its velocity in feet per second. The velocities being as the square root of the hights, if the hight fallen be 1 foot, its velocity is 8—the square root of 64. This is the constant which is employed in calculating the velocity of falling bodies from known hights, and it is sometimes called "the action of gravity upon a body falling one foot." In applying such data to ascertain the velocity of flowing water, let us suppose the head to be 100 feet, then its velocity per second is 80 feet because $\sqrt{100}\times 8=80$. This is the rule to ascertain the velocity of flowing water under any known head, only instead of 8 being used as the constant, the coefficient 5·1 is used in practice because the flow is not perfectly free through a slit—the water is retarded at the rate of about three-eighths of its theoretical speed. We will now show how this law is applicable to the calculations of the velocities of the flow of steam, air or gases. In this connection another law comes into the calculations, namely, the densities of elastic fluids. Thus the heaviest gas is the most sluggish in its flow, and *vice versa*. Taking air as a standard with a density of 1, the density of oxygen is 1·10563, while that of hydrogen is only 0·06926, and being the lightest of all gases, it flows into a vacuum with a greater velocity than any other, under the same pressure. The velocity of gases in such cases correspond very closely with the square root of their densities. Thus the square root of the density of oxygen being 1·0515 and air being 1, the time of passage of a constant volume of oxygen was observed to be 1·0519, 1·0519, and 1·0506 in different experiments, air being 1, according to Professor Graham on the "Effusion of Gases." Now by knowing the velocity of falling water, under a pressure due to its hight, and knowing the weight of water, all that requires to be done to ascertain the velocity of flowing gases, is to take their relative densities compared with water, and their pressures for the relative hights of a column of water. Thus for example a column of water 34 feet in hight exerts a pressure of 15 lbs. on each square inch at the foot of the column. As a cubic foot of water weighs 62·5 lbs. while a cubic foot of steam of 15 lbs. pressure on the inch weighs ·0373 lb. therefore if we divide the pressure 15 lbs. by ·0373—the weight of a cubic foot of steam—and multiply the quotient by 144, we shall obtain the hight of a column of steam. By extracting the square root of this hight and by multiplying it by the constant 8—as in the case of falling water—we will ascertain the velocity of the flow of steam under 15 lbs. pressure into vacuo. Thus, given the total pressure of the steam, divide this pressure per inch by the weight of a cubic foot of steam, the quotient is the hight of a column of steam one foot square. This quotient is then multiplied by 144—the number of square inches in the base of the cubic foot, and the product obtained is the hight of a one-inch square column of steam equal in weight to the given pressure on the square inch. The arithmetical process for finding the hight is represented thus:—

$$\frac{p}{w}\times 144=h.$$

and the velocity of the flow into vacuo in terms of this hight is

$$v=8\sqrt{h}.$$

Substituting in this expression the value of h previously found, we have

$$v=8\sqrt{\frac{p}{w}\times 144},$$

or by a more simple mode

$$v=96\sqrt{\frac{p}{w}}$$

This rule is obtained by multiplying the square root of 144 by 8—the constant for the action of gravity per foot. To find the velocity of steam of 15 lbs. pressure flowing into a vacuum by the above rule, a cubic foot of this steam weighs ·0373 lbs. and $15\div 0373=401·7$. Then $\sqrt{401·7}\times 96=1924$ feet per second, is the velocity with which it flows into a vacuum. To work out the velocity of different pressures, a table containing the density of steam per cubic foot under different pressures, is required, as the density increases with the pressure.

Many persons suppose that according to the increased pressure of steam, a proportional velocity of flow is secured, such as twice the velocity for thirty pounds over fifteen pounds pressure and so on. This is not so, for steam of 100 lbs. pressure has only a velocity of 2,081 feet per second, which is but a trifle greater than steam of fifteen pounds pressure. Steam from one pound pressure and upward means above atmospheric pressure. When flowing into the atmospheric instead of into a vacuum, the outer pressure must be reckoned. As the flow of steam is in proportion to its density, as well as pressure, the benefit of using "dry steam" will be apparent. The moisture carried over with the steam from the boiler to the cylinder of an engine is just so much of a drag upon its velocity, involving a proportional loss of useful effect.

The weight of steam is inversely as the relative volume. Thus as the weight of a cubic foot of water is 62·5 lbs. and as the relative volume of common steam is about 1,700 we have $62·5\div 1700=·0367$ lbs. as the weight of a cubic foot of steam. From this data we can also ascertain the weight of a cubic foot of air. Thus air is 815 times lighter than water, therefore $62·5\div 815=0766$ lbs. To ascertain the velocity of air flowing into a vacuum under 15 lbs. pressure, $15\div ·0766=195$. Then $\sqrt{195}\times 96=1,340$ feet per second as the velocity of air flowing into vacuo. As heated air is not increased in density, if the temperature is elevated to 491° Fah. its pressure is 15 lbs. on the square inch because it doubles its volume with this quantity of heat, and it will flow into the atmosphere with the same velocity as compressed air of 15 lbs. pressure will flow into a vacuum. From such scientific data, the advantages which could be secured from using dry superheated steam, and air of a high temperature in engines become evident. But owing to the impossibility of obtaining lubricating agents to withstand high degrees of heat, and owing to the deteriorating effects of elevated temperatures upon the common metals, the full theoretical benefits of high superheated steam, and of hot air cannot be secured in practice, as applied to motive engines.

PROSPERITY OF THE COTTON MANUFACTURE.

Of all the surprising effects of the present war there was certainly no one less anticipated than an unusual prosperity of the cotton manufacture, and yet there never was a time when this great interest seemed to be more flourishing than at present. The shares of all the joint stock companies are very high. Those of the substantial old Merrimac at Lowell, the par of which is $1,000, are now selling at $1,200. Those of the Laconia Company, which have been at about $600 for several years, are now, just after an extra dividend, selling at $1,205. Large additions are being made to the works in all portions of the manufacturing districts. The Manchang mill in Northbridge, Mass., has just received an addition of between 5,000 and 6,000 spindles, and so great is the general demand for machinery that the owners had an offer of 50 cents per spindle advance if they would leave the frames at the shop where they were built. The Hamlet Company at Woonsocket, R. I., is building a large addition to their mill; the Whitings at Northbridge have just completed a new dam, and J. W. Slater & Co. are enlarging their trench at Slatersville in order to supply water for their increased machinery. In short, all the manufacturing villages of New England are busy in enlarging or repairing their works, and making ready for spinning and weaving cotton on a larger scale than ever before.

It is true that many of these enlargements are made for the sake of giving employment to the workman; the manufacturers feeling that they must support their hands in any event, and that it is as well to keep them employed and get returns of some value for their support. Still, there is unquestionably a general feeling of confidence in the permanent prosperity of the business, and even at the present time, with cotton at 60 cents per pound, some styles of goods can be made at a profit.

The large mill at Quinebaug, Conn., is working Surat cotton, and it is found to make very good cloth. Business in Cohoes, N. Y., has never been more active than at present. All the cotton mills are running full time, and the hosiery establishment finds it difficult to keep pace with its orders.

Preparing Winter Pickles.—Take them from the brine, place them over the fire, and cover with fresh water; when they are scalded take them from the fire, and after throwing a little salt into the water, set them (in the kettle) to cool. The next day pour off the water, cover them again with fresh water, scald up and set away to cool, throwing in a little salt as before. Repeat this process for nine days; then scald the vinegar, dissolving in it a bit of alum the size of a nutmeg for a moderate-sized jar of pickles; while hot, pour the vinegar over the cucumbers; after a few days, if necessary, heat the vinegar a second time and pour it over them. Pickles thus prepared have no white scum rising on the surface.

© 1862 SCIENTIFIC AMERICAN, INC.

BAYONET CHARGES.

A recent article in the Portland *Transcript* thus speaks of bayonet charges. We have abridged it slightly, to suit our columns :—

To read the graphic descriptions in the daily press of fierce charges and sanguinary encounters with this deadly weapon, one would suppose that these were among the most common occurrences of the war, whereas it is a stubborn fact that not a single instance can be found in the whole history of it where opposing forces, of any considerable number, have stood for a moment in close quarters with this terrible instrument of death. This may seem a bold statement, but it is one which we think can be substantiated. On the bloody field of Fair Oaks, where Sickles's Brigade dispersed twice their number in a charge, I saw perhaps two thousand dead, among these there were but three that I noticed pierced by bayonets, since then I have participated in two charges, the last that of Hooker's Division, at Manassas, August 29, 1862, one of the most sanguinary of the war, but our line was at no time nearer than ten paces to that of the enemy, and the only two instances in which I saw the bayonet used, was that of two rebels who had got beyond the lines and refused to surrender. I have been informed by those who were in the grand charge of Hancock's Brigade at Williamsburgh, that they did not see one man injured by the bayonet. The Old Guard at Waterloo, it will be remembered, was led against the French by Wellington himself, yet the next morning but five bodies could be found on the entire field pierced by bayonet thrusts. And yet an English historian gravely relates, as an instance of John Bull's prowess, that a gigantic member of the Guard was surrounded and killed, after having bayoneted five of his enemies. These facts, however well substantiated, do not detract in the least from the value of the weapon in question as an instrument of assault, but they create sad havoc with the flowers of rhetoric, and the glowing language which "our own correspondents" make so frequent and fulsome use of, and which, while they delight the low and vile, create the greatest anxiety in the breasts of those whose relatives are in peril. But the reader may ask "If the bayonet is so seldom used, in what manner does it so often decide the fate of battles and of nations?" To which we answer, in its moral effect lies the secret of its efficiency. The attacking party always have the advantage, as it is reasonable to suppose that they know the number and strength of those whom they assault. The yells, the infuriated faces, the approach on the "double quick," all give such an exaggerated idea of the force, that the assaulted usually discharge their pieces at short range and fly. Even should they make a bold stand, the chances are greatly in favor of the attacking party coming to a halt and disputing the ground with powder and ball; thus the bayonet, though seldom drawing blood, performs an important part in every engagement.

It is amusing to the soldier to see what precise mathematical lines newspaper artists make in their pictures of charges, as if it were possible for exhausted men to advance in regular order over fields, ditches, and through woods. It is not possible. A charge is much like the rush of an infuriated mob through the streets of a city, those with the best pluck and longest legs leading off. It is particularly difficult in Virginia, where there is so much woodland, to maintain a good organization after being once engaged.

THE TOOLS WITH WHICH GREAT MEN WORK.

It is not tools that make the workman, but the trained skill and perseverance of the man himself. Indeed, it is proverbial that the bad workman quarrels with his tools. A great painter on being asked by what process he mixed his colors, replied : "I mix them with my brains, sir." It is the same with every one who excels. Ferguson made marvelous things with a penknife, such as a wooden clock that marked the hours accurately. A pan of water and two thermometers were the tools with which Dr. Black discovered latent heat. A prism, a lens and a sheet of pasteboard enabled Newton to unfold the composition of light and the origin of colors. An eminent philosopher once called on Dr. Wollaston and requested to be shown over his laboratories, in which science had been enriched by so many important discoveries. The doctor took him into his study and showed him a small tray containing a few watch glasses, test papers, a small balance and a blowpipe, saying : "Here is all the laboratory I have." Stothard learned the art of combining colors by closely comparing the wings of butterflies; a stick and a barn-door served Wilkie in lieu of canvas; Bewick practiced drawing on the cottage walls of his native village; and Sir Benjamin West made his first brushes from the hairs of a cat's tail. Ferguson made a map of the heavenly bodies by means of a thread with knots on it stretched between his eyes and the glass; and Franklin robbed the clouds of their lightning by means of a kite made with two crossed sticks and a silk handkerchief. Watts's first model of a steam engine was made out of an old syringe, and Guifford worked his problems on leather with a blunted awl, while he was a shoemaker's apprentice. These examples are by no means confined to the past century; our cotemporaneous history is full of just such instances. General Banks, the brilliant soldier, was once a machinist; General James, who was lately killed, worked as a carpenter; and many in civil life now fill high positions of honor and profit, whose early lives were a long struggle with poverty and deprivation.

A Noble Example.

Among those drafted in Lebanon county, Pa., the only man was the proprietor of the Cornwall Furnace, Mr. Robert Coleman. Not being able to go himself, he assembled his workmen and asked whether any of them would be willing to go in lieu of himself, providing he was liberally paid. After some hesitation, one of the men present informed Mr. Coleman that he was willing to go as a substitute. The man was closely questioned and fully informed of the danger to which he subjected himself, but he frankly declared that he was willing to go, on which Mr. Coleman presented him with a check for $3,000, and guaranteed, further, that, in the absence of the substitute, his family was to receive a sum each week equal to that which he earned as a laborer. In addition to this sum, Mr. Coleman stipulated to pay to the wife of the man thus acting as a substitute the sum of $3,000, in case he should be killed in battle or die by any of the diseases incident to the camp. This is a noble example of liberalty.

How Does Your Rifle Carry?

Lieut. Busk in his "Hand-book for Hythe"—the English rifle school—says: "I cannot imagine a more helpless or hopeless position than that of an individual who, having determined to expend his ten or twenty guineas in the purchase of a rifle, and guided only by the light of nature, applies to a gun-maker to supply his want. I never hear of an inexperienced buyer in search of a rifle without being reminded of the purchaser of a telescope, who, on asking the optician, among a multitude of other questions, whether he would be able to discern an object *four* miles off, received the reply: 'See an object four miles off, sir? You can see an object four and twenty thousand miles off, sir—you can see the moon, sir!' In like manner, if you naively enquire of a gun-maker whether a particular rifle will carry two hundred yards, the chances are he will exclaim emphatically: 'Two hundred yards, sir? It will carry fifteen hundred!' And so no doubt it may. The only question is, 'How?'"

Change of Color for Ships of War.

The deep black which our ships have been painted has proved to be a very prominent mark to shoot at, in consequence of which, a change has been made to a grayish drab. The steamers *R. R. Cuyler* and *Ossipee*, now at the Portsmouth Navy Yard, have been painted this shade, which makes them much more "invisible," so that one standing on this side of the river can hardly distinguish the vessels from the wharf or the water, whereas a small black boat and a schooner stood out in bold relief.—*Portsmouth Chron.*

[We were much struck with the truth of this fact a few days since when crossing one of our ferries. The iron-clad vessel, *Passaic*, is painted in lead color, and though but a few hundred yards distant from us, while the sun shone so brightly that we knew exactly in what direction to look for the vessel, we could hardly distinguish her.—Eds.

RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Boot and Shoe Stretcher.—Among the many instruments used by bootmakers to facilitate the accurate stretching and fitting of particular parts of the boot, we know of none that are superior to this excellent and ingenious implement. Three rods are so nicely combined and arranged together under the immediate control of the operator, that by turning them the instep of the boot may be raised and stretched; the toe parts may be similarly worked, and the foot portion may be widened or spread. All these operations may be effected with great ease and rapidity. We think that this invention will prove to be a very desirable acquisition to the bootmaker's shop. J. G. Young, Jr., of Auburn, Maine, is the inventor of this device.

Corpse Preserver.—The object of this invention is to arrest or check the decomposition of a body for several days after death, and to present the features in a perfectly natural state as to expression, color, &c., on the day of burial and also keep the body free from smell. The invention consists in the arrangement of a movable cooling board fitted into the body chamber with an air-tight joint, in combination with an ice-box and cold-air chamber, forming the top or cover of said bridge chamber, in such a manner that a body or corpse, fastened to the cooling board and introduced into the body chamber, is exposed to the cooling influence of the ice without coming in contact with the moisture or water formed by the melting ice, and at the same time convenient access may be had to the corpse, if is desired to look at the features of the deceased from time to time, or the corpse may be closed up air-tight if that course is rendered advisable. Lewis D. Bunn, of Morristown, N. J., is the inventor of this preserver.

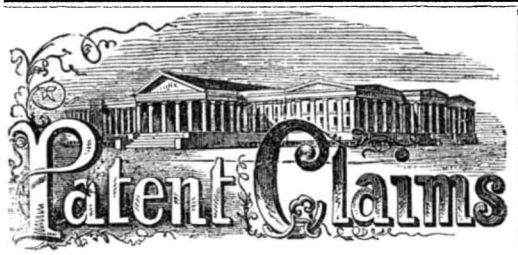
Balancing Slide Valves.—The object of this invention is to provide for the balancing of the slide valve; that is to say, to relieve it of unnecessary pressure toward its seat, and to this end it consists in making such valve of two pieces, one of which constitutes the face, and the other the back, and which are fitted together with transversely inclined planes or wedge-like surfaces, which permits them to be so adjusted relatively to each other, by a screw or its equivalent, that while the face works in contact with the seat, the back will work in contact with a parallel surface provided on the interior of the back of the valve chest, and so be kept entirely protected from the pressure of the steam. The inventor of this device is John B. Roach, of Elizabethport, N. J.

Cotton Gin.—This invention relates to that description of gin known as McCarthy's, in which one roller is employed in conjunction with a fixed and vibrating blade. It consists, first, in the employment of two of such vibrating blades acting alternately upon the usual roller and fixed blade; and, secondly, in the adaptation of apparatus whereby the material is regularly supplied to the roller and blades, and is presented thereto in a more open and suitable condition for the separation of the seeds. John Platt & Wm. Richardson, of Oldham, England, are the inventors of this gin.

Crushing Linseed.—The object of this invention is an improvement in that class of machines for crushing or mixing any substance in which two disks or wheels are employed, which are connected to a rotary vertical shaft by means of a horizontal axle, so that they have an independent rotary motion around said horizontal axle on a stationary trough or platform. The invention consists in introducing the substance to be crushed through a channel passing down through the center of the vertical shaft in such a manner that said substance is fed between the crushing wheels, and that the required supply can be effected by an elevator or other mechanical means, dispensing with the hand labor generally employed for this purpose. Thomas Rowe, of New York city, is the inventor of this improvement.

London and Pekin are expected to be connected by telegraph within a few months. A line through Russia, Siberia and Mongolia to the latter city is being constructed.

© 1862 SCIENTIFIC AMERICAN, INC.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING OCTOBER 28, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

36,760.—Ethan Allen, of Worcester, Mass., for Improvement in Back Sight for Rifles :

I claim plate, A′, and disk, B, constructed substantially as described and for the purpose set forth.

36,761.—C. H. Amidon, of Greenfield, Mass., for Improved Wringing Machine :

I claim, in combination with a turning shaft, G, that serves as a shaft and brace both, and the rising and falling crossbars, E, the arrangement of the cams, h, block, f, and spring, e, intermediately placed on said shaft and crossbar, for the purpose of making pressure on the upper roll, D, and allowing said roll to rise at either end without producing undue pressure at the other end, in the manner and for the purpose herein set forth and explained.

36,762.—C. M. Atkins, of Pottsville, Pa., for Improvement in the Construction of Railroad Cars :

I claim the cast-iron brackets, D, when applied to the inner surfaces of the angles or corners of the car bed or frame, and used in connection with the external straps or brackets, C, and bolts, a, for the purpose herein set forth.

[This invention is designed to strengthen the framing of railroad cars by causing the ends of the timbers, which comprise the car bed, to be secured much more firmly together than hitherto, so as to effectually prevent the springing out of the side and end pieces of the car bed.]

36,763.—George Bailey, of Buffalo, N. Y., for Improvement in Presses for Stamping Tickets, &c. :

I claim, first, The combination with the inking ribbon and pawls, of two shifting levers or other equivalent devices, so arranged in respect to the plate or arm to which said pawls are attached as to effect the shifting or reversing of the direction of travel of the inking ribbon, in the manner substantially as described herein.

Second, I claim, in combination with the stamp press and inking ribbon, a set of numbering or dating type wheels, arranged and operating substantially in the manner set forth.

36,764.—A. C. Bouk, of Clinton, Iowa, for Improved Mode of Rafting Logs aud Timber :

I claim the application of booms to rafting logs and timber in any waters, so as to save the timber rafted from loss either by boring every log or by obstructions like bars and snags, th us securing the timber rafted and transporting the same without diminishing either quality or quantity.

36,765.—L.D. Bunn, of Morristown, N. J., for Improvement in Corpse Preservers :

I claim the arrangement of the cooling board, C, with head-piece, a, in combination with the body chamber, A, ice-box, D, and air chamber, E, all constructed and operating substantially in the manner and for the purpose shown and described

36,766.—G. W. Buss, of Boston, Mass., for Improvement in Wagons :

I claim, first, Supporting the wagon by means of the lever or levers and spring or springs, arranged with regard to each other and to the axle, substantially as described, so that the spring or springs shall be acted upon at such a point of the lever as receives comparatively the shortest play or motion, as set forth.

Second, In combination with the lever or levers, the crossbar, l l or r r, as described and for the purpose specified.

Third, In combination with the lever or levers, i i, and axle, c c, the radial arms, f f, the whole operating together as set forth.

36,767.—D. M. Cummings, of Enfield, N. H., for Improvement in Adjustable Hames :

I claim, first, The combination of the clasp, D, and its projections, b b, with the face plate, E, and its indentations, a a a a, constructed and operating as above set forth.

Second, The combination of the terret, C, with the clasp, D, as above described.

Third, The combination of the face plate, L, with the clasp, D, and the terret, C, constructed and operating as above set forth.

36,768.—J. C. Day, of Jersey City, N. J., for Improved Hammock Cot :

I claim the portable army hammock cot constructed and arranged substantially as described and shown.

36,769.—David Dick, of Meadville, Pa., for Improvement in Apparatus for Mineral Oils as Fuel :

I claim, first, The employment in a mineral oil furnace of pumice stone or other equivalent porous incombustible material, through which the oil flows, and upon the surface of which it is burned, substantially in the manner described, for the purposes set forth,

Second, The combination of a furnace in which mineral oils are employed as fuel, with a water space surrounding the same, substantially in the manner described for the purpose of preventing the overheating of the furnace, and the consequent generation of gas in the firebox, as set forth.

Third, The combination in a mineral oil furnace of a water chamber, a firebox, and a series of air flues, substantially in the manner and for the purposes described.

Fourth, The combination of an extinguisher plate with a firebox and air tubes, substantially as and for the purpose specified,

Fifth, perforating the extinguisher plate, as described, for the purpose of permitting the escape of the gas, and preventing the entrance of air, as set forth.

36,770.—John Dickinson, of New York City, for Improvement in Apparatus for Dressing Mill Stones :

First, I claim the combination of the scroll cam wheel, I, the arm or lever, C, compensating arm, D, operating lever, U, and pawls, P and Q, for operating the scroll cam wheel, or equivalents of either of the said several parts in combination with the said scroll cam wheel, to produce the results hereinbefore set forth.

Second, I also claim the combination of the graduated scale, a2, and adjustable stop, b2, with the lever, U, and scroll cam wheel, I, for the purposes hereinbefore set forth.

Third, I also claim the use of the raised ledge, c2, on the upper side of a double guide-way parallel rule, for the purposes hereinbefore set forth.

Fourth, I also claim the use of the two strips of steel, f2, as a shield for the setting of the diamond in dressing mill stones in combination with the double guide way, d2′, substantially as hereinbefore set forth.

Fifth, I also claim the use of the two ledges, g2 g2, raised on the lower surface of the double guide way, so as to form a channel for the shields, f2, to be adjusted in, in combination with the shields, f2, for the purposes hereinbefore set forth.

36,771.—Ambler Edson, of Cambridge, Ill., for Improved Washing Machine :

I claim the slides, C C, the handles, D D, the pivoted arms, R R, the lever, O, the stirrer, F F G G H and I, in combination with the beveled pinion, K, and the beveled segment, L, as represented and for the purpose specified.

36,772.—Leonard Eggleston, of Battle Creek, Mich., for Improved Mode of Filling Bags with Grain :

I claim the combination of a movable hopper with the manner of holding it in the required position, and the manner of attaching the bag to the hopper, substantially as set forth.

36,773.—A. H. Emery, of New York City, for Improvement in Projectiles for Rifled Ordnance :

I claim, first, The construction and use of a soft metallic point arranged with a sub-caliber projectile, substantially as and for the purpose herein described and set forth.

Second, The construction and use of the compound-metallic sabot, arranged with a sub-caliber projectile, substantially as and for the purposes herein described and set forth.

36,774.—Josiah Eveland, of Elizabeth City, N. J., for Improved Mode of Connecting Fellies of Wheels :

I claim having the sockets, C C′, provided respectively with a tapering dovetail tenon and a tapering dovetail recess, fitting and operating together in the manner herein shown and described, so as to form a firm but easily separable connection between the ends of the fellies and prevent all lateral and inward spreading or bending of the felly ends, as set forth.

[The object of this invention is to obtain a coupling for connecting together the ends of wheel fellies, in such a manner that they will not be liable to be depressed or forced inward under the weight to which the wheels may be subjected when attached to the vehicle, and at the same time admit of being very readily applied to the fellies, form a firm connection and one capable of being adjusted with the greatest facility in order to form the connection.]

36,775.—Geo. B. and C. B. Garlinghouse, of Allonsville, Ind., for Improvement in Harvesters :

We claim, first, The conical or conoidal coupling hinge, K K′ L L, and set screws, F F′, arranged and adapted to the cutting apparatus of a harvester in the manner and for the purposes set forth.

Second, The branched pitman, m m′, having conical or conoidal gudgeons, K″ K‴, adjustable in the line of their common axis, within corresponding sockets in the cutter bar by means of a screw, N, or its equivalent, substantially as set forth.

36,776.—J. T. Gilmore, of Barton, Ohio, for Improvement in Machinery for Training, Staffing and Fine-dressing of Mill Stones :

I claim, first, Specifically, the employment of the arm, S, with its dovetailed guide, T, and the socket slide and set screws, e f and g, constructed and operating as and for the purpose set forth.

Second, I claim, in combination with the said arm, the shaft, W, with its crank plate, Y, beveled geared wheel, X′, and set screw, U, the same being attached to and used in combination with the other parts of the machine, to wit, the slide, K, cross plate, G, dovetailed guide, H, screw shaft, I, nut O, beveled geared wheel, N, and crank plate, R ; said several parts connecting with the circular pivot plate, F, clips, c and c′, sleeve, D, double flange, E, hollow journal, A, branch feet, B, set screws, c″, cap plate, a, screw bolts, b, and lever nut, y, the whole constructed and operating as described and for the purpose specified.

Third, I claim the mode described for attaching the machine to the bed and runner stones by means of the branched straps and grappling arms, secured as described for the purpose set forth.

Fourth, I claim the employment of the small training and staffing block, i, with its shaft fitting into the socket slide, e, and adjusted and secured by the screws, f and g, as described, and operating in combination with the horizontal movement of the arm, s, for the purpose specified.

Fifth, I claim the peculiar arrangement for using and controlling the diamond, in combination with the said arm, S, the parts constituting said arrangement being formed of the stock, j, diamond handle, i, pivoted to said stock at m, spring, u, hooked finger, o, lever, p, and handle, r, constructed and operating as set forth and for the purpose specified.

Sixth, I claim attaching the arm, S, with its dovetailed guide, T, socket slide, e, and screws, f and g, to the circular plate, F, said plate having a shoulder, t, as shown in Fig, 9, and using the same in combination with the sleeve, D, and hollow journal, A, as described and for the purpose stated.

36,777.—Benj. Gonzales, of Goodland, Ind., for Improved Chest and Table for Bread-making :

I claim the combination and arrangement of the several parts, comprised in the method of opening and closing the flour chest, E, by lowering and raising the molding board, A, the relation of the flour chest, E, by lowering and raising the molding board, A, the relation of the flour chest, E, meal chests, B, and molding board, A, the relation of the side depositions, v v, &c., to the flour chest, E, meal chest, B, and molding board, A, and the mode of attachment of meal chest, B, to flour chest, E, in the manner and for the purposes described.

36,778.—B. F. Gossin, of Cincinnati, Ohio, for Improvement in Machines for Making Joint Fastenings for Railroad Rails :

I claim, first, The arrangement of stationary bed and hardy, C D, clamping gage, L M, and simultaneously conveying dies. E E′, or devices substantially equivalent, he whole being combined and operating together, as set forth.

Second, I claim the yielding supports, K, for the temporary support of the biank, in the manner set forth.

36,779.—Sebre Howard, of Elyria, Ohio, for Improvement in Breech-loading Fire-arms :

I claim, first, Combining the barrel and the stock of my improved fire-arm with each other through the medium of the hollow breech-piece, B, which has an oblong opening in the side thereof for the temporary reception of a metallic cartridge ; but this I only claim when the said cartridge is driven forward into the chamber of the barrel of the fire-arm and is then provided with an unyielding recoil block by means of the tubular piston, E, and the levers, F and G, which are combined with each other and with the hollow breech-piece, D, substantially in the manner herein set forth.

Second, I also claim opening and closing the lateral aperture in the breech piece of my improved breech-loader by means of the tubular piston, E, which fits accurately within the bore of the main compartment of said breech-piece, and is operated therein in a longitudinal direction, substantially in the manner herein set forth.

Third, I also claim operating the tubular piston, E, by means of the levers, F and G, in connection with the slot in the under side of the tubular portion of the breech piece, B, substantially in the manner herein set forth.

Fourth, I also claim the arrangement of the trigger, e, the bridle, d, the sear, c, and the sear spring, i, with each other and with the hammer rod, H, the mainspring, b, the tubular piston, E, and the levers, F and G, substantially in the manner and for the purpose herein set forth.

Fifth, I also claim the arrangement of the set trigger, g, and the sliding pin, y, with the sear, c, and the lever, F, substantially in the manner and for the purpose herein set forth.

Sixth, I also claim combining the barrel, C, with the breech-pin, B, by slipping a portion of the butt of the former within the mouth of the latter, and then securing said connection by means of the ears, x and w, the hinged loop, h, and the set screw, m, in the manner herein represented and described.

Seventh, I also claim combining toothed and movable valve-plug, g, with the head, O, of the tubular piston, E, and with the valve seat within the same, in such a manner that a slight degree of inward pressure upon said valve plug will produce a perfectly tight joint at that end of the said tubular piston, substantially as herein set forth.

36,780.—J. M. Grosh, of Shaefferstown, Pa., for Improvement in Harvesters :

I claim, first, The jointed sliding rake arm, applied and operating substantially as and for the purpose described.

Second, Widening the claws of the binding device between their axis and their inner curved edge, substantially as and for the purpose described.

Third, The arrangement of means specified for opening and closing the claws alternately, as set forth.

36,781.—Thomas Hunter, of New York City, for Improvement in Portable Shields for Riflemen :

I claim the portable folding armature, S, made of three or more shot-proof sections, A B C, connected by hinges, a b, substantially as described, so that the same can be used as an armature, table or bedstead, in the manner specified.

And I also claim the application of the rest, F, in combination with the section, C, of the armature, S, as and for the purpose set forth.

[The object of this invention is to produce a shot-proof armature or shield, which is capable of being carried from place to place and put upon the desired spot with ease and convenience, and of protecting one or more riflemen, and affording a firm and convenient rest for their rifles while taking aim, said armature being constructed in such a manner that it can readily be folded up when it is designed to move the same from place to place, and that it can be converted into a bedstead or table, as occasion may require.]

36,782.—Daniel Hussey, of Nashua, N. H., for Improvement in Bobbins :

I claim the double-coned bobbin or spool, made as described, and the formation of the mass of roving thereon, in the improved manner substantially as specified.

36,783.— —— Huchins, of Norwich, Conn., for Improved Camp Bed :

I claim the folding frame, a, in combination with the pillow, n, rod, h, and legs, d g j, arranged substantially in the manner and for purpose described.

36,784.—J. H. Jones, of Dayton, Ohio, for Improvement in Separator and Smut Machines :

I claim, first, A scouring cylinder, which answers as a concave for a smut or grain clearing machine, whose inner circumference is dressed with a screw or spiral scouring surface, substantially as and for the purpose set forth.

Second, The combination with such screw or spiral scouring surface, of a beater, C C, whose blades, J J, and wings, d d, are arranged and operate in the manner and for the purpose substantially as described.

Third, The sieve and frame, J J′, so constructed and arranged on a smut or grain-cleaning machine, that the frame supports and acts as springs to the sieve, substantially in the manner and for the purpose described.

Fourth, The combination of the screw concave, the beater, the trunks, M L, suction spout, H H, fan, D I, sieve, J J′, and shaft, B E F, the whole constructed, arranged and operating substantially as described.

36,785.—W. H. Jordan, of Roseville, Ind., for Improvement in Cultivators :

I claim the plows, J′, when arranged so as to be simultaneously raised and lowered by the turning of the bars, I G, connected by a rod or bar, J, as shown, in connection with the laterally adjustable frame, A, connected with the axle, E, and all arranged as and for the purpose set forth.

[This invention relates to a new and improved cultivator for plowing those crops which are grown in hills or drills, such as corn, potatoes, &c. The object of the invention is to obtain a cultivator with plows so arranged that they may be lifted from and adjusted into the ground more readily than those hitherto devised, and also to have the draught pole so arranged that the line of draught may be changed at the will of the operator or attendant, and the machine thereby placed under the complete control of the farmer, so that he may readily guide the machine to conform to the sinuosities of the rows of plants, and also readily raise the plow above the surface of the ground in turning at the ends of rows.]

36,786.—John Laughlin, of Gettysburgh, Pa., for Improvement in Mode of Attaching and Detaching Whiffletrees :

I claim the arrangement of the spring bolts, E E, the bent levers, F F, the boxes, I I, the straps, G G J, and the bar, H, constructed and operating in the manner and for the purpose herein specified.

36,787.—John Lees, of Racine, Wis., for Improvement in Churns :

I claim the construction and arrangement of the dashers, No. 2 No. 2, connecting rods, No. 3 No. 3, attached to driving wheel, No. 1, the whole constructed and operating substantially as hereinbefore set forth.

36,788.—C. McGinniss, of Chicago, Ill., for Improvement in Smut and Separator Machines :

I claim, first, In combination with the surrounding perforated internally ribbed cylinder, G g g′, the angularly corrugated scourer, G g′ m m′ n o p, the whole constructed and operating substantially in the manner and for the purpose specified.

Second, Arming the scourer, G′, and the vertical ribs, g, and upper head of the cylinder, G, with oval form projections, g′, as described.

Third, Providing for the uniform distribution of the grain in its passage from the shoe, U, to the shoe, V, by means of inclined distributing channels or their equivalents, on the bottom of the shoe, U, substantially as described.

Fourth, The combination of the slotted adjusting rods, w w, and hinges, u u, substantially as and for the purpose described.

Fifth, The combination of the screening shoes, U and V, with the slotted adjusting rods, w w, and hinges, u u, the whole arranged and operating substantially in the manner and for the purpose described

36,789.—John Platt and William Richardson, of Oldham, England, for Improvement in Cotton Gins :

We claim, first, The two alternately reciprocating blades, c h, constructed and arranged to operate in combination with each other and with the roller, a, and breast, b, of the McCarthy cotton gin, in the manner and for the purposes herein shown and explained.

Second, The employment or use of combing or carding instruments, substantially as herein described for opening the material preparatory to its presentation to the ginning mechanism, a b c.

Third, The transferring comb, u v, constructed as described, and employed to present the material in tufts to the ginning mechanism, a b c, substantially as and for the purposes set forth.

Fourth, The elastic or yielding connecting rod, o p q, employed to operate the comb, u v, substantially in the manner described.

36,790.—N. W. Northrup, of Greene, N. Y., for Improvement in Combined Car Wheel and Car Axles :

I claim the divided follower, D, set screw, C, on axles, B, in combination with the tight wheel, E, in the manner and for the purpose hereinbefore set forth.

36,791.—Glendy Moody, of Falmouth, Maine, for Improvement in Machines for Spreading and Turning Hay :

I claim, first, A reciprocating bar, M, with forks, L, pivoted to it, and operated by means of cranks or other equivalent eccentric movement, substantially as and for the purposes set forth.

Second, The combination of a carriage, A, with suitable actuating gearing and a series of independently reciprocating forks, L, which receive a united reciprocating motion from a series of cranks or equivalent eccentric means, substantially as and for the purposes set forth.

Third, The cross bar, N, with its slots, j, and loops, i, or equivalent means, in combination with the uprights, g g, for the purpose of adjusting the forks, substantially as described.

Fourth, The swivelling eyes, f, in combination with the bar, N, and pivoted forks, L, substantially as and for the purpose set forth.

36,792.—G. A. Poppy and C. H. Colegrove, of Rochester, Ohio, for Improvement in Water Elevators :

I claim the compound clutch and brake, G, in combination with the spring lever, L, weighted pawl, F′, and pulley, C, when these parts are constructed, arranged and operated as and for the purpose herein set forth.

36,793.—N. B. Powers, of Lansingburgh, N. Y., for Improved Composition for Sizing for Use in the Manufacture of Floor Cloths, &c. :

I claim the employment or use of a sizing compound made of the within described ingredients mixed together in about the proportions specified.

[This invention consists in the employment as a sizing compound of a composition of blood and lime, either alone or in combination with other ingredients, to be applied to canvas used in the manufacture of floor oil cloths, or to other textile fabrics or paper.]

36,794.—N. B. Powers, of Lansingburgh, N. Y., for Improved Composition for Sizing and Steeping Floor Cloths, &c. :

I claim the employment or use of a sizing compound made of the ingredients herein specified, and mixed together in about the proportions set forth.

[This invention consists in the employment as a sizing compoun of a mixture of blood and tannin, either alone or in combination with other ingredients, to be applied to textile fabrics, such as canvas used in the manufacture of floor oil cloths, or to any other textile fabric or paper.]

© 1862 SCIENTIFIC AMERICAN, INC.

36,795.—John Price and William Lewis, of Danvillle, Pa., for Improvement in Piles for Railroad Rails:

I claim the employment of the flanged layer, i, on top, or on top and bottom of the pile, A, when the same is used in combination with the layers, h g f, and arranged so as to form recesses, k, between the points of its flanges and the next adjoining layer, f, as and for the purpose shown and described.

[An engraving and full description of this invention has been published in last week's SCIENTIFIC AMERICAN.]

36,796.—M. B. Riggs, of New York City, for Improvement in Guard Fingers for Harvesters:

I claim, first, The construction of the finger with a cavity, E, so arranged as to permit the fastening of the stationary cutter, J, as described; and also, so as to secure nearly equal thickness to the walls, sides and parts of the finger throughout, as and for the purpose hereinbefore described.

Second, I claim fastening the blade, J, beneath the cutter bar, in the manner set forth and for the purposes specified.

36,797.—J. B. Roach, of Elizabethport, N. J., for Improvement in Slide Valves of Steam Engines:

I claim the combination of the two inclined pieces, B C, and adjusting screws, j g, with each other, and with the valve seat, a a, and back, b b, in the manner herein shown and described.

36,798.—Gregory Roth, of Cincinnati, Ohio, for Improvement in Candle Molding Machines:

I claim the arragement of the stationary perforated racks, B B′ B″, and the perforated slide, C, adapted to retain and center the candle while permitting the descent of a full-sized tip mold, substantially as set forth.

36,799.—Thomas Rowe, of New York City, for Improvement in Machines for Crushing Linseed, &c.:

I claim introducing the substance to be crushed through a channel, e, passing down through the center of the vertical shaft, C, and discharging through the aperture, f, between the crushing wheels, E, substantially as and for the purpose herein shown and described.

36,800.—John Rynearson, of Farmington, Ill., for Improvement in Harvesters:

I claim, first, In the described combination with the vertically curved platform, G, the rake, H, pivoted to and projecting horizontally forward from the rake arm, I, by which it is carried in a vertical orbit, all as herein shown and described.

Second, The guide, L, and spring, h, operating in the described combination with the pivoted rake-head, H, to present it in the proper position to gather the grain, and afterward retract it therefrom.

Third, The fender, Q, employed in combination with the pivoted rake, H, in the manner and for the purpose specified.

Fourth, The yielding hood, i, operating in combination with the revolving rake, H I, substanally as and for the purpose explained.

Fifth, A platform constructed of vertically curved slats placed transversely of the machine at sufficent distance apart to admit the points of the rake teeth between them, when used in combination with the rake, H I, revolving in a vertical orbit, all as herein shown and described.

[The prominent feature of novelty in this invention isa raking device, so operated and regulated as to remove the grain from the platform, in compact even gavels without scattering.]

36,801.—Daniel Sager, of Albany, N. Y., for Improvement in Self-Acting Wagon Brakes:

I claim the brake block, X, formed as shown and fitted to resolve freely upon an axle from the extremity of the brake bar, for the purpose set forth.

The mode of construction by which the brake-block is fitted and secured upon the axle, to wit, the combination of the orifice, M, the groove, a b, and its flange, t, with the axle, G, flange, f, and space, y, substantially as described and for the purpose set forth in the above specification.

36,802.—James and A. W. Sangster, of Buffalo, N. Y., for Improvement in Lamp Chimney Fastenings:

We claim the stationary lip, I, the movable lip on the lever, F, the spring, E, the thumb piece, K, and the aperture, V, arranged in the manner and for the purpose herein set forth and described.

36,803.—David Saunders, of New York City, for Improvement in Machines for Cutting and Planing Metals:

I claim, first, The arrangement of the plates, c and d, screws, e e e′ e′, actuated by the shafts, 4 5 and 6, and gearing connecting the the same, in combination with the table, g, applied as and for the purposes specified.

Second, I claim the shaft, h, and wheel, h′, in combination with the said plates, c and d, adjusted as aforesaid, and applied in the manner and for the purposes specified.

Third, I claim the secondary bed, l, in combination with the plate, k, when said bed and plate are connected by the flanges, in substantially the manner specified, so as to provide for inclining the second bed, l, as and for the purposes set forth.

Fourth, I claim the arrangement of the gearing, 13 14 15 and 16, for actuating the wheel, p, that gives an end movement to the rod, o, and slide, u, as set forth.

Fifth, I claim the slide, u, applied as aforesaid, in combination with the tool stock, x, and rotary lever or cutter, y, fitted and acting as and for the purposes specified.

36,804.—O. Sherwood, Jr., of Independence, Iowa, for Improvement in Grinding Mills:

I claim the adjustable frame, D, having the bed-stone, C, placed upon it, and arranged as shown in connection with the spindle or shaft, B, and the upper stone or runner, so as to be operated through the medium of the bridge-tree, G, for the purpose herein set forth.

[This invention relates to an improvement in regulating the millstones for the purpose of causing them to grind finer or coarser as may be desired, and consists in having the bed-stone arranged in such a manner that it may be raised and lowered on the spindle, while the latter, as well as the upper stone or runner, and the water wheel have a rotary motion only.]

36,805.—J. D. Smedley, of Chicago, Ill., for Improved Grate for Burning Petroleum and other Liquid Fuel:

I claim, first, The arrangement and combination of the trough or grate, A, and the air-conducting pipes, B B, substantially as described and for the purpose above set forth.

Second, The arrangement and combination of the trough or grate, A, the air-conducting pipes, B B, &c., and the supply pipe. D, with its gage cock, I, appended, substantially as described and for the purpose above set forth.

Third, The arrangement and combination of the trough or grate, A, the air-conducting pipes, B B, &c., the supply pipe, D, with its gage cock, I, appended, and the damper, E, substantially as described and for the purpose above set forth.

Fourth, The arrangement and combination of the trough or grate, A, the air-conducting pipes, B B, &c., the supply pipe, D, with its gage cock, I, appended, the damper, E, and the lower air chamber, L, substantially as described and for the purpose above set forth.

Fifth, I claim so constructing the trough or grate, A, narrowing from its upper surface and edges at an angle or curve to the bottom, as to present continually reducing areas of surface, substantially as described and for the purpose above set forth.

6,806.—W. S. Smoot, of Washington, D. C., for Improvement in Combined Time and Concussion Fuses for Shells:

I claim, first, The improvement in the means of igniting time fuses by combining the windage and concussion principles, substantially as and for the purposes set forth.

Second, The improvement in time fuses of providing them with a communication with the shell, closed by a sliding valve or plunger just above the point at which the fuse ignites, substantially as and for the purposes set forth.

36,807.—F. B. Stevens, of New York City, for Improvement in Surface Condensers:

I claim closing the ports of exit and entrance of a condenser or cooler of a steam engine, and attaching pipes leading to the boiler and to the atmosphere, substantially as described.

36,808.—F. B. Stevens, of New York City, for Improvement in Shields for Surface Condensers:

I claim a guard enclosing a surface condenser or cooler, placed on he outside submerged surface of a vessel, substantially as described.

36,809.—F. B. Stevens, of New York City, for Improvement in Surface Condensers:

I claim forming a surface condenser or cooler, by a system of headers, elbows and horizontal tubes placed on the submerged surface of a steamer, as herein set forth and described.

36,810.—F. B. Stevens, of New York City, for Improvement in Surface Condensers:

I claim, first, Forming a surface condenser or cooler on the outside submerged surface of a steamer, by placing there one or more thin and flat passages, containing the steam to be condensed or water to be cooled, and having a lamina of the water in which the steamer floats interposed between them.

Second, The passages so arranged that each passage has its own separate port of entry and of exit.

36,811.—James Thompson, of Vevay, Ind., for Improvement in Churns:

I claim the arrangement of tube, A, having the flaring crotches, B B′, in combination with the rotary dash, D, having in one plane a handle, F, and the tongue, c, which tongue is adapted to couple with the notched shaft, E, the whole being constructed and operating in the manner set forth.

36,812.—A. C. Twining, of New Haven, Conn., for Improved Mode of Uniting Timbers:

I claim the construction and employment of such iron bearings or steps, when formed or furnished with teeth or knobs, standing apart and in rows, substantially as and for the purpose described.

Also the hooked front of the rows or knobs for giving a draw, as above described.

Also the construction and employment of rolled iron strips with teeth or knobs, substantially as above.

36,813.—Richard Vose, of New York City, for Improvement in Car Springs:

I claim the arrangement within a suitable casing of one or more series of volute springs, I I, and a number of layers, H H, of some elastically-yielding substance, when the requisite number of metallic combining and steadying plates, D E, are arranged with the said volute springs and elastically-yielding layers, in the manner represented by the accompanying drawings, and herein particularly set forth.

36,814.—Henry Underwood, of New York City, for Improved Belt Coupling:

I claim the connecting of rivets, B, permanently in pairs, by means of straps, C, swaged with the rivets from or out of a single piece of copper, to form an improved belt coupling or joint.

[This invention relates to a new and useful improvement in the rivet coupling or joint hitherto employed for connecting together the ends of machine belting. The invention consists in having the rivets connected together in pairs by a strap, the rivets and strap being swaged in proper form from a single piece of copper, whereby several advantages are obtained over the ordinary rivets.]

36,815.—J. M. and W. C. Wallis, of Milton, Iowa, for Improvement in Hand Corn Planters:

We claim the plunger, D, provided with the recesses, g m, in combination with the partitions, E, provided with the cut-off brush, k, and the elastic plates, F B, and fixed plate, d, all arranged relatively with each other and within the box, A, to operate as and for the purpose herein set forth.

We further claim the stop, G, attached to the plunger, D, and provided with the spring, o, when arranged relatively with the side, c, of the box, A, and used in combination with the elastic plates, F B, inclined partitions, E, brush, k, and fixed plate, d, as and for the purpose set forth.

[This invention relates to an improved corn planter of that class which are designed for manual operation and consists in a novel arrangement of a plunger provided with a seed-cell and used in connection with a cut-off or partition, spring plates, and a stop, arranged in such a manner that the device may be operated and the seed measured, dropped and planted with the greatest facility.]

36,816.—H. F. Wieseck, of New York City, for Improved Sugar Tablets for containing Medicines:

I claim, first, The manufacture of tablets of sugar crystals, bearing numbers in figures of like material, and—

Second, The process which completes the manufacture, and endows the tablets of sugar crystals with a healing power, by exhausting the air from their capilliary interstices, and then impregnating them with alcoholtures (remedies in alcoholic form).

36,817.—John Woodward, of Wilmot, N. H., for Improvement in Gates:

I claim a gate twice or more than twice the length of the space used as a passage way, provided with the grooved rails and flanged rollers, constructed and operating in the manner and for the purpose set forth.

36,818.—J. G. Young, Jr., of Aubnrn, Maine, for Improved Boot and Shoe Stretcher:

I claim, first, The arrangement of the lifting rods, E E′ H, in combination with the nut, F, screw, G, toggle arms, b c b′ c′, l, cap, C, and side pieces, D, all constructed and operating, substantially in the manner and for the purpose shown and described.

Second, The cap, C, arms, b c b′ c′, lifting rods, E E′, in combination with the central part, B, screw, G, and nut, F, loop, i, and hook, j, when arranged to operate in the manner and for the purposes specified.

36,819.—S. C. Crane (assignor to D. R. Barton), of Rochester, N. Y., for Improvement in Skates:

I claim connecting the foot piece, B, and the runner, D, of skates substantially in the manner specified, viz.: by placing the clamping points, e, at one-fourth of the width of the runner below the foot piece, in combination with the collar, C, when the latter is constructed as described, and is placed entirely below the lower face of the foot piece, in the manner and for the purposes specified.

36,820.—Smith Groom (assignor to himself and Jacob Shavor) of Troy, N. Y., for Improvement in Explosive Canister Shot:

I claim a canister shot or shell, so constructed as to shoot forward the wood or metal plug, A, war missiles, O, and wadding, E, in the manner substantially as herein described and set forth.

36,821.—A. L. Poitevin, of Paris, France, assignor to Leopold Eidlitz, of New York City, for Application of Photography to Printing:

I claim, first, The application, in the process of photographic engraving hereinbefore described, of a plate of glass or other suitable surface coated with a solution of gelatine which is allowed to set or solidify, and is then (either before or after being dried) immersed in or exposed to the action of a solution of bichromate of potash or other chromate whose base does not produce an insoluble compound with gelatine.

Second, The application in the process of photographic engraving in manner hereinbefore described, of a plate or surface coated with a mixture of gelatine and bichromate of potash or other suitable chromate, or first coated with gelatine, and then exposed to the action of the bichromate of potash or other suitable chromate, in either case without the addition of nitrate of silver.

Third, The application of a solution of proto-sulphate of iron to the surface of the photographic gelatine engraving, before pouring the plaster upon it, in the process of taking a plaster cast from the gelatine, as hereinbefore described.

Fourth, The mode hereinbefore described of metallizing the surface of the gelatine before submitting it to the electrotype process.

36,822.—Lewis Powe (assignor to McCurdy & Co.) of Pittsburgh, Pa., for Improvement in the Manufacture of Sheet Copper:

I claim the mode of treating the sheets of copper after they have passed through the reducing rollers, substantially as and for the purpose hereinbefore set forth.

36,823.—John Slingerland, of Greenpoint, N. Y., assignor to himself and J. H. Kelly, of New York City, for Improved Window Stop:

I claim, first, The combination and arrangement of the movable inclined piece, D, and the stop, d′, or its equivalent, with the elastic roller, E, substantially as and for the purpose herein described.

Second, I also claim, in combination therewith, the employment of teeth, or of equivalent roughened surface on the face of D, for the purpose herein set forth.

36,824.—Charles Stowell, of Concord, Mass., assignor to himself and W. M. Gaylord, of Northampton, Mass., for Improvement in Blasting by Electrical Currents:

I claim my improved arrangement or application of the shield, the circuit wires and the strip of platina, substantially as described.

36,825.—William Mullally, of St. Paul, Minn., for Improvement in Pumps:

I claim the combination of the hollow operating and discharging rod, K, hollow diaphragm, E F G I, internal valve, J, chambers, a b, and ports, N O f g, the whole being arranged to operate in manner substantially as and for the purposes set forth.

[This is a new and improved form of diaphragm pump, by which a continuous stream of water may be thrown with great force and with the smallest possible expenditure of power.]

36,826.—Giuseppe Tagliabue, of New York City, for Improved Apparatus for Testing Coal Oil:

I claim, first, The vessel, B, extending above the stand, A, and having holes in it near the top.

Second, The cup, P, with its projections on the outside.

Third, The ring, Q, in the cup, P, that holds the cover, C, and its appendages upright in any position other than over the vessel, B.

Fourth, The perforated tube, D, that surrounds the thermometer, and enters the ring, Q, allowing the cover, C, to stand in any position.

Fifth, The dome, F, with the opening, L, in front, for applying the lighted paper or wood, and the opening, K, on top.

Sixth, The rotating covers, J J, on the cover, C; each and all as and for the purposes substantially as described.

[An engraving and description of this invention will be found on page 184 of the current volume of the SCIENTIFIC AMERICAN.]

36,312.—Eli Thayer, of Worcester, Mass., for Improvement in Plane Angulometers. Patented August 26, 1862:

I claim the pendulum, moving upon three or more bearings in the same plane, and carrying upon its top a graduated arc, and its combination with the spherical surface, and the opening therein, substantially as set forth and described in the accompanying specifications and drawings, and for the purposes indicated.

35,929.—J. H. Foster, of Pittsburgh, Pa., for Improvement in Attaching Movable Type to Cylindrical Surfaces. Patented July 22d, 1862:

I claim, first, Using a stereotype plate in combination with movable type, on a curved surface, by making that portion of the "turtle" or segment of a cylinder upon which the base of the type rests, deeper than that part occupied by the stereotype plate, for the purpose of bringing the face of the type to the same degree of curvature also for creating a wall or shoulder against which the type may be secured.

Second, I claim the use of column rules in the form of the segment of a circle, having grooves on one or both sides describing the same curve, in combination with wedge-shaped "leads" or equivalent device, for the purpose hereinbefore stated.

Third, I claim separating the upper portion or face of the lines of type (arranged for printing on a curved surface) to a greater distance than the base thereof, by means of wedge shaped "leads" or equivalent device, without requiring the type to be grooved for the purpose of retaining them in place.

Fourth, I claim the use of a stereotype plate formed in such a manner as that the face or lettered surface shall be longer and project over the lower edge of the bearing part next to the movable type, when used upon a cylinder or curved surface, sufficient to dispense with the use of wedge-shaped column rules, which would be indispensable upon a curved surface, if this was not done.

RE-ISSUES.

1,347—No. 1.—P. W. Gates, Thomas Chalmers and D. R. Fraser (assignees through mesne assignments to Wheeler Hedges) of Chicago, Ill., for Improvement in Evaporating Sugar Juices and Solutions by Means of Steam. Patented Nov. 29, 1859:

We claim the cooking or evaporating of sirup and sugar juices by using steam coils, in such manner as to produce violent ebullition at the point where the steam first expends a portion of its heat upon the coils and sirup, and from such point have the ebullition gradually decrease in violence or to subside—so that the scum or feculent matter separated from the juices may be caused to flow toward, and equably and completely deposit outside of the side margin or margins of the stream or body of juice in the pan, substantially as set forth.

1,348—No. 2.—P. W. Gates, Thomas Chalmers and D. R. Fraser (assignees through mesne assignments to Wheeler Hedges) of Chicago, Ill., for Improvement in Apparatus for Evaporating Sugar Juices and Solutions. Patented Nov. 29, 1859:

We claim, first, The combination of the transverse stops, F F, and the pan, C, with inclined sides, the stops having a narrow flow passage equal to the width of the bottom of the pan beneath them, substantially as and for the purpose set forth.

Second, The combination of the stops, F F, the pan, C, and defecator, C′, substantially as and for the purpose set forth.

Third, The combination of the coils, G G′, operating as described, or in a manner equivalent thereto, the pan, C, and the fire furnace, A, substantially as and for the purpose set forth.

Fourth, The combination of the deep preparatory heaters, B B′, the shallow evaporating pan, C D, and steam coils, G G′, or equivalents thereof, and fire arch, A, substantially as and for the purpose described.

Fifth, The combination of the preparatory heaters and cleaners B B′, and the defecator, C′, substantially as and for the purpose described.

Sixth, The arrangement of the two sets of coils, B B, two chambers, B′ B′, and the receiving and exhaust steam pipes, g h, and the sirup cocks, k k, substantially as and for the purpose set forth.

Seventh, The combination of the evaporating pan, C, steam coils, G G′, or their equivalents, inclined side beaches, D D, and gutters, E E, substantially as and for the purpose described.

Eighth, The combination of the inclined beaches, D D, and the gutters, E E, substantially as and for the purpose described.

1,349—No. 3.—P. W. Gates, Thomas Chalmers and D. R. Fraser (assignees through mesne assignments to Wheeler Hedges), of Chicago, Ill., for Improved Apparatus for Defecating and Evaporating Sugar Juices. Patented Nov. 29, 1859:

We claim an evaporating pan constructed with a defecating apartment, for the purpose set forth.

1,350—No. 4.—P. W. Gates, Thomas Chalmers and D. R. Fraser (assignees through mesne assignments to Wheeler Hedges), of Chicago, Ill., for Improved Evaporating Pan for Sugar Juices and Solutions. Patented Nov. 29, 1859:

We claim an evaporating pan for sirup and sugar juices, construeted with a shallow depth by having one or both of its sides form a continuation of its bottom by rising on inclined planes, substantially as set forth.

Second, The combination of the pan, constructed as described, and a laterally-located defecator, substantially as set forth.

EXTENSION.

Jarvis Howe, of Worcester, Mass., for Improvement in Boot Trees. Patented Oct. 24, 1848:

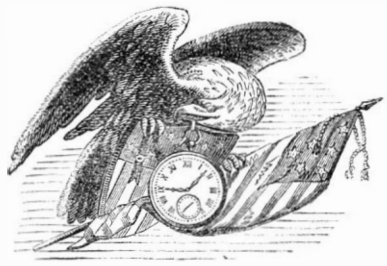
I claim the combination of the swivel and turning journal and its bearing with the frame boot tree and mechanism for distending the parts of the leg, substantially as set forth.

I also claim the peculiar arrangement of the bo t tree upon its supporting st the same being represented in the drawing.

TAX ON SALARIES OF CONGRESSMEN.—The tax on the salaries of members of the House of Representatives will be a handsome sum. Each member is taxed $72 per year; the Speaker $144. The next house will consist of 204 members, and the aggregate sum realized will be $14,520 a year. The amount derived from the employes of the house will be $7,433.

© 1862 SCIENTIFIC AMERICAN, INC.

PATENTS FOR SEVENTEEN YEARS.



The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The vice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention is susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the nventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

R. W., of N. Y.—Your sketch of a sword-fish steamer which you propose for the capture of the pirate vessel *Alabama*, and to run down other rebel craft, is entirely different in principle from the design and construction of a vessel that is required for such service. It is not a long sharp ram for piercing that is required but one that will smash in the the sides of an opponent. Great speed cannot be obtained at sea in a small vessel because it cannot carry engines of sufficient size.

G. M. H., of Maine.—The Malaga raisins are prepared by allowing the grapes to remain on the vines until they become sufficiently dry to be picked off and packed in boxes with a sheet of paper between each layer. The stem of each bunch is partially severed with a sharp knife when on the vine, and all the leaves are removed to allow full exposure to the sun. The grapes thus exposed soon shrivel and become sweet. Other raisins are prepared by drying ripe grapes after they are picked, either in the sunshine or in heated rooms.

H. S. L., of Mass.—Alcohol may be manufactured from every vegetable containing starch, and any substance containing sugar. The Tartars manufacture a spirituous liquor from asses' milk. All milk contains sugar, which by fermentation generates alcohol.

F. A. S. P., of N. Y.—We are unacquainted with a single case wherein a submarine vessel has been employed with success in attacking an enemy's ship under water. Your plan of employing a submarine ram to use electrical barbed shells for blowing up iron-clad vessels is ingenious, and for special purposes may be practical, but not for general operations.

J. H. S., of Wis.—The *Engineer* and *Mechanics' Magazine* are the leading weekly mechanical journals published in England. You can obtain either of them through the agency of Messrs. Willmers & Rogers of this city.

J. P. E., of Pa.—We shall be very glad to illustrate your furnace for steam boilers. Its publication will bring it before thousands of engineers and manufacturers who will take an interest in it. The engraving will belong to you after its publication in our paper.

R. S., of Conn.—To obtain the silver from clippings of photographic paper containing nitrate of silver first burn them, then take their ashes and place them in a crucible with some borax, and subject the crucible for an hour to a bright red heat. The silver will be found in the form of a button at the bottom of the crucible. Saltpeter and carbonate of potash will answer as a substitute for borax.

J. S., of C. W.—It was at one time supposed that every line of telegraph required a separate battery to operate it, but this was a mistaken notion. Ten lines are frequently worked from the same battery, and these lines run in all directions—east, west, north and south. Only one ground wire is used for all the lines and only one wire is brought from the battery to the operating room where all the lines are attached. This single battery also operates different instruments—the Morse, Combination and House telegraphs. The use of one battery for so many lines effects a great saving in the expense.

H. G., of Ohio.—You should make experiments with your castings in order to determine the strength of the column, after they have been completed and ready to be erected. It is not safe to take the general strength of the iron as your guide, for the castings may be imperfect. The falling of the Pemberton mills at Lawrence, Mass., as described on page 162, Vol. II. (new series) SCIENTIFIC AMERICAN, was caused by the imperfect cast-iron columns used to support its floors.

G. H. B. of Governor's Island.—Your communication is written in an excellent Christian spirit, but it is not exactly suited to our columns.

J. K., of Md.—Black lead crucibles are composed of plumbago and clay. Good crucibles are also made with a mixture of puro fire-clay, old crucibles ground to coarse powder and black lead. Equal parts of these substances are kneaded together with water, molded, dried slowly, then fired in a kiln. Two parts of the hardest coke ground together into coarse powder, kneaded with water to the proper consistency, molded and dried slowly, makes good crucibles, being baked in a kiln. Hessian crucibles are composed of fire-clay and siliceous sand, after being dried they are fired in a kiln. It requires much practice and skill to mold and manufacture crucibles.

J. L. St. F., of N. J.—The term "*ignis fatuus* vitality" must have been manufactured for some particular purpose. It is not in use in our language. It may be appropriate if understood to mean "living deceptive light," but *ignis fatuus* means vain or foolish fire, and when applied to "Will-o'-the-Wisp" and "Jack-o'-the-Lantern," it has reference to the night-light seen in marshes, fens and swamps and its cause is not yet well understood. It is supposed to be due to the evolution and flame of marsh gas. In all likelihood the light is a phosphoresence, due to the ignition of decayed organic substances containing phosphorus, which ignites and burns at the atmospheric temperature with a flame of low heat.

J. A., of N. Y.—Overman on the "Manufacture of Iron" is a work which will afford you the information you desire.

A. E. K. Jr., of N. Y.—You will find a very full description of the mode of cleaning and preserving the prints of engravings, by Dr. Hayes, State Assayer of Massachusetts, on page 389, Vol. VI (new series) SCIENTIFIC AMERICAN.

G. L. D., of Pa.—The substance that is used for the paste of stamps and envelopes is dextrin, or an artificial gum, made by roasting starch at a certain temperature. You will find a full description of the process in "Muspratt's Chemistry" and other works on the same art. It is put on either with a sponge or a brush You will find the method described under the article envelopes in the "American Cyclopedia."

Money Received

At the Scientific American Office on account of Patent Office business, from Wednesday, October 29, to Wednesday, November 5, 1862 :—

J. R., of N. J., $52; J. A. McC., of N. Y., $20; A. C., of Va., $85; G. McK., of England, $20; B. S. & J. M., of Pa., $20; H. B., of Iowa, $20; T. W. W., of Iowa, $20; E. J. C., of Ill., $20; J. L. E., of Ill., $20; J R. P., of N. Y., $35; B. & C. F., of Iowa, $20; A. B., of N. Y., $20; J. W. F., of Pa., $20; G. C., of N. Y., $10; H. A. A., of Ill., $25; N. P., of N. Y., $25; T. P., of N. Y., $15; H. M., of Mass., $30; A. L., of N. Y., $15; F. S. B., of Iowa, $25; W. H. S., of Conn., $25; J. C., of U. S. A., $30; M. N. K., of Iowa, $15; S. B. E., of Conn., $10; R. W., of N. Y., $15; N. J., of Ind., $15; F. A. DeM., of N. Y., $15; T. V. C., of U. S. A., $15; G. G. G., of N. Y., $22; W. S., of Mich., $25; H. G. P., of N. Y., $10; M. H. F., of N. Y., $15; C. A. & Co., of Conn., $325; H. B., of Mich., $25; J. A. DeB., of N. Y., $40; A. M. W., of Cal., $15, G. G., of N. Y., $15; W. T. E., of N. J., $15; R. D. M., of Md., $43; F. M. C., of N. Y., $50; W. H. W., of N. J., $25; A. J. E. of N. Y., $25; J. W. S., of N. Y., $25; N. P., of N. Y., $15; W. A. P., of Cal., $20; A. B., of N. Y., $20.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from October 29, to Wednesday, November 5, 1862:—

A. C., of Va. (2 cases); D. H., of N. Y.; H. A. A., of Ill.; N. P., of N. Y.; J. W. S., of N. Y.; K. P. K., of Vt.; A. J. E., of N. Y.; F. S. B., of Iowa; W. H. S., of Conn.; F. M. C., of N. Y. (2 cases); H. M. of Mass.; W. H. W., of N. J.; H. B., of Mich.; W. G. V., of England; J. G. M., of England.

TO OUR READERS.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

THE CHEAPEST MODE OF INTRODUCING INVENTIONS.

INVENTORS AND CONSTRUCTORS OF NEW AND useful Contrivances or Machines, of whatever kind, can have their Inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN on payment of a reasonable charge for the engraving.

No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no secondhand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

For further particulars, address—

MUNN & CO.,
Publishers SCIENTIFIC AMERICAN
New York City.

© 1862 SCIENTIFIC AMERICAN, INC.

RATES OF ADVERTISING.

Twenty-five Cents per line for each and every insertion, payable in advance. To enable all to understand how to compute the amount they must send in when they wish advertisements inserted, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

Back Numbers and Volumes of the Scientific American.

VOLUMES I., II., III., IV., V., VI. (NEW SERIES) COMPLETE (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1 50 per volume, by mail, $2—which include postage. Price, in sheets, $1. Every mechanic, inventor or artizan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. Numbers 3, 4, 6, 8, 9, 10, 11, 12 and 16, of Vol. VI. are out of print and cannot be supplied.

Binding.

We are prepared to bind volumes in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents; by express, or delivered at the office, 40 cents.

TO BLAST FURNACE MANAGERS.—HEAT GAGES for shewing the temperature of hot air for sale, also Steam and Water Gages, Glass Tubes, Gage Cocks, Whistles and Indicators for ascertaining the working horsepower of Steam Engines. E. BROWN, 311 Walnut street, Philadelphia, Pa. 1*

BUSINESS CHANCES.—A YOUNG MAN, OF EXPERIence with machinery, desires to take charge of the whole or a part of some established manufacturing business. Is an experienced draftsman. Address Engineer, Newark, N. J.

WAIT'S IMPROVED JONVAL TURBINE WATER Wheels are the cheapest and best iron wheels in use. Send for circular. Address P. H. WAIT, Sandy Hill, N. Y. 20 3*

THE NEW YORK OBSERVER
IS A RELIGIOUS AND SECULAR NEWSPAPER, PUBlished on a double sheet, so as to be easily separated into two dispapers.

In Religion it is free from sectarianism, and gives a full, fair and impartial report every week of all matters of general interest in all the denominations.

In Politics it is entirely free from party relations or affinities, discussing great principles with freedom and candor, and giving the fullest and latest intelligence of all the movements of the day. It supports the Government with vigor, fidelity and zeal, in its efforts to crush the rebellion and restore the Union and preserve the Constitution. It criticises with freedom whatever measures are not adapted to the accomplishment of these ends; but its steady purpose, from the beginning of the war, has been, and will be, to uphold the hands and strengthen the heart of the Government, while it puts forth its energies to protect us against the most unholy rebellion that ever disturbed the peace of any country.

The N. Y. Observer is the most complete family newspaper in the world. In the variety of its Departments, in the fulness of its Information, in the extent of its Correspondence, in the number of minds enlisted in its Editorial and other columns, in the amount of money expended in procuring materials to enrich and adorn its pages, in the healthful, religious, conservative, genial tone that pervades the paper. In its stores of anecdote, biography, poetry, science, art and general literature, it will strive to exceed every other weekly paper.

GREAT INDUCEMENTS.

The proprietors of the New York Observer offer the following valuable premiums for new subscribers. In all cases, the new subscribers must be those who have not in their own or others' names taken the paper during the past year.

TO MINISTERS AND OTHERS.

The Annals of the American Pulpit, by Rev. William B. Sprague, D. D., are comprised in seven large octavo volumes, viz., Congregational, 2 vols.; Presbyterian, 2 vols.; Methodist, 1 vol.; Episcopal, 1 vol.; Baptist, 1 vol. They contain the biography of more than a thousand ministers, and a history of each denomination, with a statement of its doctrinal views, making a complete library of religious biography and history. The lives of these ministers are interspersed with memorable anecdotes and incidents, and illustrated by letters from distinguised statesman and clergymen, rendering the volumes an inexhaustible source of instruction and entertainment. The publishers' price for the seven volumes is $18 50. We will furnish the whole set to the order of any person who will send us twelve new subscribers with the payment for one year, or any two volumes for four new subscribers, or any one volume for two new subscribers. In all cases the money ($2 50 for each subscriber) must be paid in advance.

TO FARMERS AND OTHERS.

We will furnish the whole set of the following works to any one who will send us fifteen new subscribers—with payment of $2 50 in advance on each for one year, viz:—

American Farmer's Encyclopedia	$4 00
Allen's (R. L.) American Farm Book	1 00
Allen (J. Fiske) on the Culture of the Grape	1 00
Barry's Fruit Garden	1 25
Boussingault's Rural Economy	1 25
Bridgeman's Young Gardener's Assistant	1 50
Buist's American Flower Garden Directory	1 25
Comprehensive Farm Record	3 00
Dadd's Modern Horse Doctor	1 00
Dadd's American Cattle Doctor	1 00
Dana's Muck Manual	1 00
French's Farm Drainage	1 00
Garlick's Fish Culture	1 00
Herbert's Hints to Horse-Keepers	1 25
Warder's Hedges and Evergreens	1 00

To any one sending us ten new subscribers and advance payment for each, one year, we will send the Farmer's Encyclopedia, Farm Record, and any five other books on the list—or the entire list, except the Encyclopedia and Record.

For five new subscribers, with payment in advance, we will send the Farmer's Encyclopedia and Farm Record, or any other five books in the list.

For four new subscribers and payment, the Encyclopedia and any book less than $3.

For three new subscribers, the Farm Record and any dollar book.

For two new subscribers, any two books in the list costing less than $3 each. And for one new subscriber any book costing less than $3 on the list.

These books will be sent by mail or express, at the option or expense of the subscribers.

Every evening devoted to canvassing may secure one or more of these volumes.

They are among the most practical works now published on the subjects treated. With this collection of books in his library, neither the beginner nor the more advanced farmer need go further for the instruction desired in any branch of his pursuits.

They are here placed within the reach of every young man in the country, without a dollar in money.

Specimen copies of the paper sent free to any address.

SCHOOL OF DESIGN, SET OF MATHEMATICAL INstruments for mechanical and architectural drafting, price $6, put up and for sale by JAMES W. QUEEN & CO., 924 Chestnut street, Philadelphia. Agents and importers of the Swiss drawing instruments, mathematical and philosophical instrument makers. Priced and illustrated catalogue sent gratis. 18 8*

PORTABLE STEAM ENGINES—COMBINING THE maximum of efficiency, durability and economy with the minimum of weight and price. They are widely and favorably known, more than 200 being in use. All warranted satisfactory or no sale. A large stock on hand ready for immediate application. Descriptive circulars sent on application. Address J. C. HOADLEY, Lawrence, Mass. 20 13

WOODWORTH PLANERS—IRON FRAMES TO PLANE 18 to 24 inches wide, at $90 to $110. For sale by S. C. HILLS, No. 12 Platt-street, New York. 1a

TO MUSKET MANUFACTURERS.—A MACHINE FOR turning and cutting the thread on the breech pin of the Springfield Rifled Musket, just finished and for sale by J. R. BROWN & SHARPE, Providence, R. I. 17 tf

RICHARDSON, MERIAM & CO., WORCESTER, MASS., make very superior Daniel's and Woodworth Planers; Mortising, Tenoning, Matching, Molding, Boring, Spoke and Sawing Machines, Turning Lathes and other improved Wood and Iron Working Machinery. Send for circulars. 16 5*

OIL! OIL! OIL
For Railroads, Steamers, and for Machinery and Burning. PEASE'S Improved Engine and Signal Oil, indorsed and recommended by the highest authority in the United States. This Oil possesses qualities vitally essential for lubricating and burning, and found in no other oil. It is offered to the public upon the most reliable, thorough and practical test. Our most skillful engineers and machinists pronounce it superior to and cheaper than any other, and the only oil that is in all cases reliable and will not gum. The SCIENTIFIC AMERICAN, after several tests, pronounces it "superior to any other they have ever used for machinery." For sale only by the Inventor and Manufacturer, F. S. PEASE, No. 61 Main street, Buffalo, N. Y.
N. B.—Reliable orders filled for any part of the United States and Europe 18 13

TO PHOTOGRAPHERS.—IMPROVED PHOTOGRAHIC Camera, Patented March 25, 1862, by A. B. WILSON (Patentee of the Wheeler and Wilson Sewing Machine), adapted to all photographic work; such as Landscapes, Stereoscopic Views, Carte Visites, Ambrotypes, &c. Can be used by amateurs and others from printed directions. Send for a circular. Address A. B. WILSON, Waterbury, Conn. 16tf

DAMPER REGULATORS.—GUARANTEED TO EFfect a great saving in fuel, and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms or flexible vessels of any kind. Orders promptly attended to, or information given, by addressing CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, 229 Broadway, N. Y.
Responsible agents wanted. 14 26*

FURNITURE WHOLESALE AND RETAIL.—DEGRAAF and Taylor still continue the Wholesale and Retail Furniture and Bedding business at No. 87 Bowery, New York, and have now on hand the largest surplus stock ever before offered in this city, which they are determined to close out at very low prices; also Carll's Patent Towel Stand and Clothes Dryer, the most convenient article in use. All work guaranteed as represented. DEGRAAF & TAYLOR, No. 87 Bowery, New York. 12 22*

VULCANIZED INDIA RUBBER ROLLS.—BEST OF India Rubber Rolls and coverings for Rolls for Washing, Wringing and Starching Machines, on fair terms, constantly on hand. Metropolitan Washing Machine Company, 345 Broadway, New York city. Sole and exclusive owners of the right under Goodyear's Patent. 11tf

UNIVERSAL CLOTHES WRINGER.—AGENTS AND Canvassers wanted for this best of all Wringers. Rubber Clothing Company, 37 Milk street, Boston. R. O. BROWNING, Agent, 345 Broadway, New York city. 11tf

SOLID EMERY VULCANITE.—WE ARE NOW MANUfacturing wheels of this remarkable substance for cutting, grinding and polishing metals, that will outwear hundreds of the kind commonly used, and will do a much greater amount of work in the same time, and more efficiently. All interested can see them in operation at our warehouse, or circulars describing them will be furnished by mail.
NEW YORK BELTING AND PACKING CO.,
14 13 Nos. 37 and 38 Park-row, New York.

LAUTH'S PATENT SHAFTING, PISTON RODS, MANdrels, Plates, &c., of iron or steel. Address the subscribers (who are the only manufacturers under Mr. Lanth's patents in the United States, and who have the exclusive control of said patents), for circulars containing statements of the results of experiments made by William Fairbairn, of Manchester, England, and Major William Wade of U. S. A., also other valuable testimonials. JONES & LAUGHLINS, Pittsburgh, Pa. 1y*

FULTON'S COMPOUND, FOR CLEANSING STEAM boilers of scale.—This article is powerful to remove scale, and will not injure the boiler. Western agents, WALWORTH, HUBBARD & CO., Chicago, Ill. Sole proprietor, E. H. ASHCROFT, No. 82 Sudbury street, Boston, Mass. 9 tf

GUILD & GARRISON'S CELEBRATED STEAM Pumps—Adapted to every variety of pumping. The principal styles are the Direct Action Excelsior Steam Pump, the improved Balance Wheel Pump, Duplex Vacuum and Steam Pumps, and the Water Propeller, an entirely new invention for pumping large quantities at a light lift. For sale at Nos. 55 and 57 First street, Williamsburgh, and No. 74 Beekman street, New York.
1 tf GUILD, GARRISON & CO.

EMPLOYMENT! AGENT WANTED!! A NEW ENterprise.—The Franklin Sewing Machine Company want agents, at a salary of $40 per month and expenses paid. For particulars address, with stamp, HARRIS BROTHERS, Box 302 Boston, Mass. 20 tf

BAIRD'S PATENT PREPARATION FOR THE PROtection of Steam Boilers from Incrustation.—It does not injure the metals; is a great saving of fuel; does not foam, and works equally well in salt and fresh water. For sale by JAMES F. LEVIN, No. 23 Central Wharf, Boston, Mass. New York depot, COLES & CO., No. 91 West street. 4tf

QUARTZ MILLS OF THE MOST APPROVED KIND. Manufactured by BURDON, HUBBARD & CO., 102 Front street, Brooklyn, N. Y. Also agents and manufacturers of the best Patent Premium Amalgamator, the best and simplest in use for saving both fine and coarse gold. 14 13

HOMINY MILLS.—EVERY GRIST MILL SHOULD have one. J. Donaldson's self-feeding, discharging, separating and grading Hominy Mill, the only one in use. It works the corn dry, yet hulls it perfectly. Can be run by horse or steam power, and can be set from one to four-horse power. Hulls from 10 to 50 bushels of corn per day. It weighs 300 pounds, occupies a space of four feet square, is not liable to get out of order, and is reliable in every particular. Price of mills at the shop $100. Address THOMPSON & DONALDSON, Rockford, Ill. 10 13

HAMILTON E. TOWLE, CIVIL AND MECHANICAL Engineer Office, 156 Broadway, New York. 17 tf

GRINDSTONE SHARPENER.—THE USE OF THIS tool, when stone is turning wet, will prevent dust, save time and power while grinding, and keep circumference of stone true, and the face straight, convex or concave. I want persons to sell Machines and Territory. Address GEO. C. HOWARD, No. 17 South 18th street, Philadelphia, Pa. 17 4*

WARREN'S IMPROVED TURBINE WATER WHEEL. (Warren & Damon's Patent.) The most powerful water-saving wheel in use. Also improved Regulators expressly for turbines. For illustrated pamphlets, address ALONZO WARREN, agent, American Water Wheel Company, 31 Exchange street, Boston, Mass. 17 8*

"CAYUGA CHIEF" AND "CAYUGA CHIEF, JR." Parties wishing to engage in the manufacture of the above popular Reapers and Mowers can address the patentee, C. WHEELER, JR., Poplar Ridge, Cayuga County, N. Y. 5*

IMPORTANT TO INVENTORS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court. Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of sixteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, or sending a model or drawing and description to this office.

Consultation may be had with the firm between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given a the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Offices are cordially invited to call at their office.

They are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business they have Offices at Nos. 66 Chancery Lane, London; 29 Boulevard, St. Martin, Paris, and 26 Rue des Eperonniers, Brussels. We think we may safely say that three-fourths of all the European Patents secured to American citizens are procured through our Agency.

A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office, or either of the Branches. They also furnish a Circular of information about Foreign Patents.

The annexed letters from former Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that while I held the office of Commissioner of Patents MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly, CHAS MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster General of the United States, he addressed to us the subjoined very grateful testimonial:—

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,
Your obedient servant, J. HOLT.

MESSRS. MUNN & CO.—*Gentlemen:* It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your Agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, WM. D. BISHOP.

Communications and remittances should be addressed to
MUNN & CO.,
Publishers, No. 37 Park-row, New York.

PUMPS! PUMPS!! PUMPS!!!—CARY'S IMPROVED Rotary Force Pump, unrivaled for pumping hot or cold liquids Manufactured and sold by CARY & BRAINERD, Brockport, N. Y. Also, sold by J. C. CARY, No. 2 Astor House, New York. Vol.7 1tf

BURDON, HUBBARD & CO. MACHINISTS.—MANUfacturers of Horizontal, Portable and Hoisting Steam Engines, Steam Engines, Sugar Mills, Saw and Grist Mills, Boilers, Hydraulic Presses, Pumps and Gearing for working mines, &c. &c. No. 102 Front street, Brooklyn, N. Y. 14 13

MACHINE BELTING, STEAM PACKING, ENGINE HOSE.—The superiority of these articles, manufactured of vulcanized rubber, is established. Every belt will be warranted superior to leather, at one-third less price. The Steam Packing is made in every variety, and warranted to stand 300 degs. of heat. The Hose never needs oiling, and is warranted to stand any required pressure; together with all varieties of rubber adapted to mechanical purposes. Directions, prices, &c., can be obtained by mail or otherwise at our warehouse. NEW YORK BELTING AND PACKING COMPANY.
JOHN H. CHEEVER, Treasurer,
14 13 Nos. 37 and 38 Park-row New York.

IRON PLANERS, LATHES, FOUR SPINDLE DRILLS Milling Machines, and other Machinist's Tools, of superior quality on hand and finishing, and for sale low. For description and prices address NEW HAVEN MANUFACTURING COMPANY, New Haven, Conn. 26

A MESSIEURS LES INVENTEURS—AVIS IMPORtant. Les Inventeurs non familiers avec la langue Anglaise e qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur languenataile. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront regues en confidence. MUNN & CO.,
SCIENTIFIC AMERICAN Office. No. 37 Park-row, New York.

Zur Beachtung für deutsche Erfinder.

Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu addressiren an
MUNN & Co.,
37 Park Row, New-York.

Auf der Office wird deutsch gesprochen.

Daselbst ist zu haben:

Die Patent-Gesetze der Vereinigten Staaten,

nebst den Regeln und der Geschäftsordnung der Patent-Office und Anleitungen für den Erfinder, um sich Patente zu sichern, in den Ver. St. sowohl als in Europa. Ferner Auszüge aus den Patent-Gesetzen fremder Länder und darauf bezügliche Rathschläge; ebenfalls nützliche Winke für Erfinder und solche, welche patentiren wollen.
Preis 20 Cts., per Post 25 Cts.

© 1862 SCIENTIFIC AMERICAN, INC.

Improved Patent Skate.

In business or in pleasure the national mind turns ever toward invention ; herewith we present a newly patented device for fastening skates to the feet. Fig. 1 is a view of the invention as applied ; A being the runner, B the sole plate, which is faced with leather, *a*, thereby keeping the feet warmer, and C the heel-plate. Upon the side of the sole-plate may be seen a short angle piece or clasp, *b*, which binds upon the boot sole ; this runs under the leather, is corrugated upon its inner face and adjusted to the foot by means of the screws, *c*. The plate, D, is let into the front edge of the heel and secured to it and the shank of the boot by screws. The small bolt, with the thumb-screw, *d*, attached, has an L-head, which passes through a recess and catches over the inside edge of the plate, D. When we add that the heel-plate has a small flange, *e*, projecting upward, which is inserted in a space left for that purpose between the heel and plate, C, to prevent forward motion, we comprise the whole of the details. Fig. 2 is a section of the invention having similar letters of reference, and it shows

Fig. 2

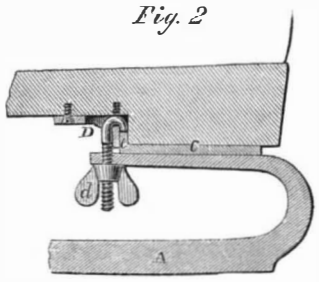
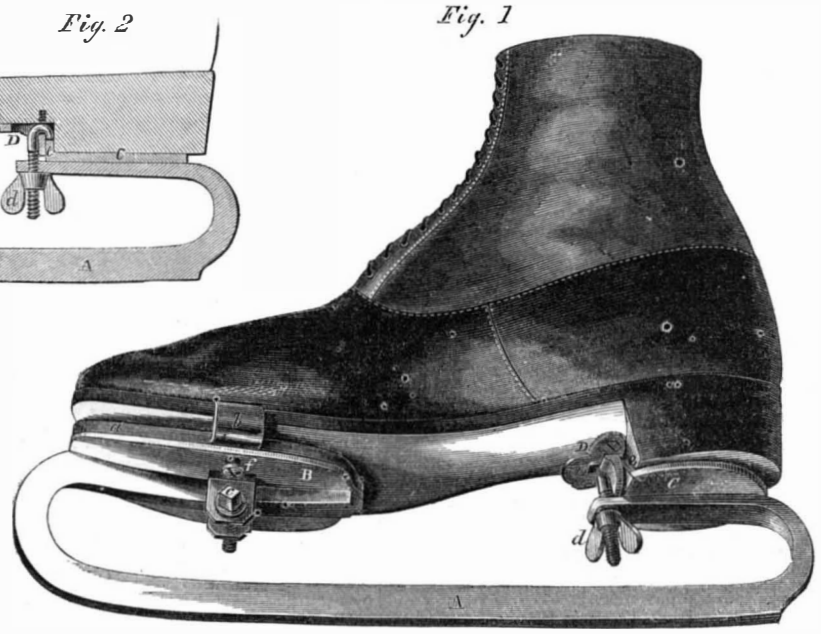


Fig. 1



BRADY'S PATENT SKATE.

clearly the attachment of the bolt, *d*, to the heel-plate, D. The process of adjustment is simple ; the foot is placed upon the heel-plate, C, and the bolt, *d*, screwed up ; this brings the boot solidly down on the skate, the side clamps are then brought up against the sole by the screws, *c*. If, on examination, the skate is found to be on one side, it may be altered by slacking off the small screws, *f*, and shifting it until correct. The notable features are lightness, simplicity of fastening and ease of adjustment. These fittings can be applied to any form of iron ; the one shown, however, is desirable to those who like elasticity of movement.

The patent for this invention was procured through the Scientific American Patent Agency, Sept. 23, 1862. Further information respecting it may be obtained by addressing Mr. O. G. Brady at 440 Broadway, New York.

The Discovery of Shot-making.

About seventy years ago there lived in the city of Boston, England, a Mr. William Watts, a plumber and glazier. To this occupation he added that of a shot-maker. At that time shot-making was but a partially developed art, and consisted in letting drops of melted lead fall into a vessel of water from a hight of but two or three feet, which caused the drops to suddenly cool in a rounded form. But as the metal did not thoroughly solidify before it reached the water, the sudden contact of it with the latter caused a slight indentation on the surface of every shot exactly at the point where it first touched the liquid. In fact, it destroyed or rather prevented perfect sphericity—a slight imperfection to all appearance, but quite sufficient to prevent the little missiles from traveling in a straight line when sent from a gun.

Mr. Watts was a bit of a sportsman himself, and seeing that with the shot as then made he could not secure a certain aim, he investigated the matter, and soon came to the conclusion that that imperfect sphericity was the cause of the shot flying wide of the mark. The fault ascertained, the question next was how to correct it. He racked his brain day and night, hoping to discover some method of making a perfectly round shot—many were the experiments he made, but all in vain, and he at last gave up the idea in despair.

But Mr. Watts had a wife who was not so easily beaten, and she had set her wits to work also. She was a remarkably quiet, thoughtful woman, and took it into her head that, as there was a cure for almost every ill, so there might be a remedy for bad shot. She was one of those who did'nt know what impossibilities meant. This idea having entered her mind, there it remained, and we all of us know that if a woman sets her heart on accomplishing anything, accomplish it she will. Day after day she watched the process of shot-making, as she sat by the water tank knitting away for dear life, but saying never a word, though eye, brain and fingers were not unemployed for a moment. So matters went on for many months ; Mr. Watts became desponding ; his business fell off, and poverty stared him in the face. Rather than make imperfect shot, he cared not to make any, and he must soon have gone to ruin had it not been for a dream.

One night Mr. Watts was suddenly aroused from comfortable slumber by a vigorous shake of his shoulder. Rubbing his eyes, and "God blessing" himself, he sat bolt upright in bed, and perceived with great surprise (for the moon was shining into the chamber) that his usually quiet wife was pacing the room, exclaiming, not "Eureka," but something very much to the same effect : "I've found out how to do it ;" and then she added : "Get up directly, William, I've made your fortune !"

Mr. Watts was now thoroughly awake, and Mrs. Watts related her "vision of the night."

She had dreamed (or rather thought in her sleep) that, if the drops of molten lead were allowed to fall through the air from a considerable hight, so as to get thoroughly hardened before they reached the water, their perfectly spherical forms would not be damaged by the sudden contact therewith. The next morning Mr. and Mrs. Watts, in great secresy, tried the experiment. Opposite their house was a lofty old church tower—that of St. Mary Redcliffe—and this tower was selected as the scene of operations. The sexton was a neighbor. From him the key was borrowed, and by eight o'clock Mr. Watts was there with a charcoal brazier, some lead, a bucket of water, and the shot card (or mold) as the implement was called, through which the melted lead was poured or strained to form drops. You may be sure they locked themselves in. The staircase of the tower was circular, so that a "well" was formed from the top to the bottom—just the thing required. At the summit Mr. Watts fixed his "card," while at the bottom Mrs. Watts stood beside the pail of water, on the added contents of which, before long, so much might depend.

All was at length ready, and down dropped the molten shower of glistening globules of metal. Hissing and spattering they fell into the water, until all the lead above was used, and then, with eager haste, Mrs. Watts plunged her hand into the now warm fluid, and drew some of the shot therefrom. Examining them eagerly she had the inexpressible delight of seeing that each and all were faultless—perfectly and entirely spherical. The problem was solved—the triumph achieved—and, as she said, she had made her husband's fortune.

Mr. Watts speedily procured a patent, and "Watts's Patent Shot" was patronized by King George the Third and his scapegrace son, the Prince of Wales. In fact, it speedily superseded all other sorts, and Mr. Watts in a brief period realized an enormous fortune. —*Commercial Bulletin.*

PROSPECTUS

OF THE

SCIENTIFIC AMERICAN.,

THE BEST MECHANICAL PAPER IN THE WORLD

EIGHTEENTH YEAR!

VOLUME VII.—NEW SERIES.

A new volume of this widely circulated paper commenced on the 2d of July. Every number contains sixteen pages of useful information, and from five to ten original engravings of new inventions and discoveries, all of which are prepared expressly for its columns.

The SCIENTIFIC AMERICAN is devoted to the interests of Popular Science, the Mechanic Arts, Manufactures, Inventions, Agriculture, Commerce, and the Industrial pursuits generally, and is valuable and instructive not only in the Workshop and Manufactory, but also in the Household, the Library and the Reading Room.

The SCIENTIFIC AMERICAN has the reputation, at home and abroad, of being the best weekly journal devoted to mechanical and industrial pursuits now published, and the proprietors are determined to keep up the reputation they have earned during the seventeen years they have been connected with its publication.

To the Inventor !

The SCIENTIFIC AMERICAN is indispensable to every inventor, as it not only contains illustrated descriptions of nearly all the best inventions as they come, but each number contains an Official List of the Claims of all the Patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week the best scientific journals of Great Britain, France and Germany; thus placing in our possession all that is transpiring in mechanical science and art in these old countries. We shall continue to transfer to our columns copious extracts from these journals of whatever we may dee of interest to our readers.

Chemists, Architects, Millwrights and Farmers !

The SCIENTIFIC AMERICAN will be found a most useful journa to them. All the new discoveries in the science of chemistry are given in its columns, and the interests of the architect and carpenter are no overlooked ; all the new inventions and discoveries appertaining to these pursuits being published from week to week. Useful and practical information pertaining to the interests of millwrights and millowners will be found published in the SCIENTIFIC AMERICAN, which information they cannot possibly obtain from any other source. Subject in which planters and farmers are interested will be found discussed in the SCIENTIFIC AMERICAN; most of the improvements in agricultur l implements being illustrated in its columns.

To the Mechanic and Manufacturer !

No person engaged in any of the mechanical pursuits should think of doing without the SCIENTIFIC AMERICAN. It costs but four cents per week ; every number contains from six to ten engravings of new machines and inventions which cannot be found in any other publication. It is an established rule of the publishers to insert none but original engravings, and those of the first-class in the art, drawn and engraved by experienced artists, under their own supervision, expressly for this paper.

TERMS.

To mail subscribers:—Two Dollars a Year, or One Dollar for six months. One Dollar pays for one complete volume of 416 pages ; two volumes comprise one year. The volumes commence on the first six JANUARY and JULY.

CLUB RATES.

Five Copies, for Six Months	$4
Ten Copies, for Six Months	8
Ten Copies, for Twelve Months	15
Fifteen Copies, for Twelve Months	22
Twenty Copies, for Twelve Months	28

For all clubs of Twenty and over, the yearly subscription is only $1 40 Names can be sent in at different times and from different Post-offices Specimen copies will be sent gratis to any part of the country.

Western and Canadian money, or Post-office stamps, taken at par fo subscriptions. Canadian subscribers will please to remit 25 cent extra on each year's subscription to pre-pay postage.

MUNN & CO., Publishers,
No. 37, Park-row, New York.

FROM THE STEAM PRESS OF JOHN A GRAY

© 1862 SCIENTIFIC AMERICAN, INC.